

Defining an aquifer: Water experts explore interconnectedness

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Daniel O'Melia, Observer Staff

Months of research on the "most complex" aquifer system in the state – the chain of water formations underlying Far West Texas - was presented at the Texas Water Development Board's conference, "Aquifers of West Texas," last week in Sul Ross' University Center.

Representatives from an assortment of state water concerns, including water "prospectors" interested in the commercial potential of the water reserves beneath the sandy soils of West Texas, were the largest group in attendance - next to the strong presence of the scientific community. The three-day conference was also attended by local government representatives, ranchers and other property owners and students. Despite the research and learning accomplished to date "there is still. So much more to be known about the hydrogeology of our West Texas aquifers," states Report 356, released this month by the state Water Development Board.

Though the 19 individual papers presented last Wednesday covered a wide geographic range bounded by El Paso, Fort Stockton and Study Butte/Terlingua, the intricate flow of shared water - or "communication" - between the 11 known aquifers in our area suggest that the health of one may have definite consequences on others.

Communication, while an understood principle in the abstract, is a feature of our region's groundwater system that is not fully documented. Several of the recognized aquifers are known to communicate among themselves. For that reason, it is important to understand that local action can have consequences on water properties at a regional scale, several presenters suggested.

According to Dr. Robert Mace of the Texas Water Development Board "although we show the aquifers as separate entities, many are hydraulically connected to each other."

In the Alpine vicinity, the water supply is drawn from the formation known as the Igneous aquifers. The wellfield at Sunny Glen taps into this system to provide the municipal supply, and private wells throughout the area draw from this resource as well. However, according to Andrew Chastain-Howley of Water Prospecting, LLC, our system is "poorly understood," referring to the Igneous aquifers as the "least-studied aquifers in the region."

This relative lack of understanding may prove even more important in the light of findings of the just-published TWDB report. On the basis of papers published in Report 356, it is now understood that the Igneous aquifer system is linked to an underground formation near Valentine that has recently been the target of plans by El Paso to address the water needs of that city.

The El Paso plan at issue calls for water to be piped from the Antelope Valley Farm property outside of Marfa which is drawn, ostensibly, from the a formation known as the Ryan Flat aquifers. The TWDB Report 356 indicates that Alpine's Igneous aquifer is connected to the very same Ryan Flat Bolson aquifer currently under the eye of El Paso.

Since the bounds of the Igneous aquifer are not fully mapped, the rule-of-thumb, according to Chastain-Howley, is that the boundary is "coincident with the occurrence of igneous rocks in the area." Put differently, the Igneous aquifer stops when one finds no more igneous rocks along the edge of the area.

According to Robert Mace of the TWDB, writing in Report 356, "much of the water produced from wells in the Ryan Flat Bolson aquifer at Antelope Valley Farm is sourced from igneous rocks."

Edward S. Angle, also of the TWDB and writing in the same report, concludes that, "many of the wells in the Salt Flat," - of which Ryan Flat is a part - "penetrate and produce water from underlying formations, including the. Igneous aquifer."

Put simply, evidence seems to indicate that a section of the Igneous aquifer runs beneath the Ryan Flat aquifer itself.

When asked about the connection, Tom Beard, Chairman of the Far West Texas Regional Water Planning Group and head of the newly-formed Brewster County Underground Water District, replied, "it's true. It's definitely true. The two systems are connected."

What remains to be understood about the connection is the effect that activity in one aquifer may have in terms of water quantity and quality in the next. As of now, the experts are just not sure. According to sources, the El Paso plan would call for a removal of between 15,000 and 50,000 acre-ft. each year. Current pumping in that area for local use stands at only 12,000, according to Report 356. In the context of the relationship between Igneous aquifers and the Ryan Flat Bolson aquifer, the effects of massive additional pumping seem more relevant than previously understood.

According to Lee Doherty of the Jeff Davis Underground Water District, the plan is unfeasible on that basis alone.

"The recharge," - the amount of water that naturally replaces water lost in a system - "just isn't there. We're not going to let this happen." Janet Adams, Manager of the Jeff Davis County Underground Water District, indicated in her remarks to the conference that the District's regulatory authority could be brought to bear as the El Paso plan unfolds. "We have not had to enforce the limits yet," said Adams, but as matters unfold Adams said, "that could come up."

Among the steps under consideration would be to set an outright limit to the amount of water El Paso would be allowed to remove each year - additional sources indicated that

an upper limit of 15,000 acre-ft. per year could be enacted, thus keeping El Paso's draw to the minimum of its reported hopes.

Additional studies are underway, and though they have not been completed at the time of publication, may add to the understanding of the interconnectedness of the two systems. However, the El Paso plan seems to have difficulties above and beyond local response. El Paso's pipeline approach is estimated to bring the cost of an acre-foot of water (the amount of water used by a typical family of four in one year) from its current level of \$200 to \$225 to a cost of between \$700 and \$800 per acre-foot.

That higher cost, however, according to Chairman Beard, is still vastly understated. Said Beard: "those are very low numbers. Unfeasible numbers." Based on an analysis he performed over a year ago, the actual cost per acre-foot would skyrocket to \$1,200 to \$1,500, once additional considerations like "impact on the environment" and "the lawsuits that will probably come up," are taken into account. Echoing Beard's observation about the cost for each unit of water in the El Paso plan, Edward S. Angle of the TWDB cites recent studies that indicate "producing large amounts of water may not be economically feasible."

Economic feasibility was the theme of the conference's field trip to the Valley Farms operation outside Ft. Davis. One of seven scheduled sites on the conference's field trip around the region, the Valley Farms greenhouses are an example of a water-dependent enterprise adapting to meet the conditions of the dry West Texas region. Though initial concerns about water depletion from local groundwater sources was an issue at the outset of Valley Farm site planning, according to a plant representative, "the wells in Ft. Davis haven't dried up, and don't look like they're going to anytime soon." The facility produces approximately 19 million pounds of beefsteak tomatoes each year in its 41-acre greenhouse. If grown in standard outdoor fields, the same crop would require some 160 acres of land to achieve. Though the 286 acre-feet of water used each year in Valley Farms operation seems high for so small a facility, plant personnel were quick to point out that "it goes into a system that has two plantings a year instead of one, and operates 350 days out of the year, instead of the 100 to 120 for standard farms of similar yield."

Though the plant does discharge several thousands of gallons of wastewater each year, it does so by depositing into a field selected for its remoteness from the groundwater supply. Additionally, the hydroponic methods used at Valley Farms' greenhouse facility allow the farmers to reclaim much of the water lost through normal evaporation and transpiration.

"If it weren't for the high mineral content of the water here," said Tony Seneca of Valley Farms, "and the water we have to treat for use in transport, we might be able to recycle all the water in the farm." Among the other sites visited on the Conference field trip were the springs at Davis Mountains State Park, Kokernot Springs in Alpine, Balmorhea State Park and the Salt Basin near Valentine. Conference organizer Ted Angle said, "The response we got was very positive - we definitely accomplished our goals." Though the event was a first for the area and more work remains to be done, Angle would like to see

opportunities for sharing the work being done by groups like the TWDB in the future. Copies of Texas Water Development Board Report 356 are available to the public. For a copy of the report contact the TWDB online at www.twdb.tx.state.us or by phone at 512-463-7847