

# The Water Tap: An overdrawn aquifer is causing Cedar Valley to sink

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Even in the desert, landscapes are often structured by water. This is the case for Cedar Valley, which rests on top of a huge natural reservoir of water, called an aquifer, which sits beneath the surface.

Since at least the year 2000, that aquifer has been sinking due to overuse of its water, causing the surface landscape to sink along with it in some places.

According to 2016 numbers from the Utah Division of Water Rights, Cedar Valley has been overdrawing water from the aquifer beneath it by between 4,000 and 8,000 acre-feet per. An acre-foot of water is about the volume of water that would fill a football field to a depth of about one foot. Estimates show annual depletion of groundwater at 28,000 acre-feet while annual recharge, water coming into the aquifer from streams, lags behind at between 20,000 and 24,000 acre-feet.

Why does this matter? When we use groundwater at a faster rate than it is replenished, the surface, once buoyed up by the water beneath it, starts to collapse. The aquifer structure contains underground silt and rock that holds large quantities of water like a sponge. Once exposed to open air, these layers dry out and the space vacated by water start to compact, forever altering the storage capacity of the aquifer by permanently eliminating that porous space. This creates a problem for aquifer management and recharge capabilities.

It also becomes a problem for residents whose homes may sit on fissure lines that form as the earth fractures and sinks into the space vacated by the missing water. In 2009, subsidence became a problem for developers of the Parkview Subdivision in Enoch.

By the time an Enoch city inspector noticed cracking pavement near the designated Parkview lots in 2009, the subdivision had roads, sidewalks, utility lines and one completed house. Development of the area by PP&D Construction halted, the house was eventually used for practice by the fire department, and the Utah Geological Survey stepped in to conduct a study.

“It was around the same time that all this was occurring that the property went to tax sale and nobody bought it,” said Enoch City Manager Rob Dotson. “The fissure actually reversed the direction of the sewer. We pulled all our water and sewer infrastructure out of the ground and the electrical companies did the same.”



The UGS study, published in 2014, found 8.3 miles of fissures in Cedar Valley, with surface subsidence of as much as 3 feet in some places. Utah Geologist Tyler Knudsen, the lead author on the study, said that fissures usually form along the edges of locations with the greatest water depletion. While not directly linked to well drilling, fissures often coincide with areas where well pumping is highest. In Cedar Valley, this occurs in Enoch and near Quichipa Lake west of Cedar City.

The main fissure in Enoch, labeled the Enoch-graben-west fissure, was estimated to be sinking on the east side by about 1.7 inches per year. The geologists who published the study believe that the EGW1 fissure is more than 50 years old and expanded by approximately 800 feet to the south between 1997 and 2006. The fissures are even visible in some aerial imagery.

Since the 2014 study, however, limited work has been done to evaluate whether the fissure has continued to expand or the surface has continued to drop. The Central Iron County Water Conservation District installed a few dozen monuments throughout Cedar Valley to use to measure surface subsidence, which they do once per year. Their data show that the ground has continued to drop since 2014, by as much as 7/10ths of a foot in some places as of 2019.

How this might be affecting existing communities or planned developments, however, is anyone's guess. Knudsen said that UGS geologists have been trying to keep an eye on the fissures using satellite imagery, but that a lack of funding for research has prevented them from following this situation more closely.

“It’s apparent that things are still moving out there. But nothing has really been quantified by us. It’s really just windshield surveys,” Knudsen said. “We’re directed onto funded projects and for some reason there’s not a lot of money that people want to throw at this right now. So, it’s unofficial, but we’re just trying to keep an eye on it as much as we can.”

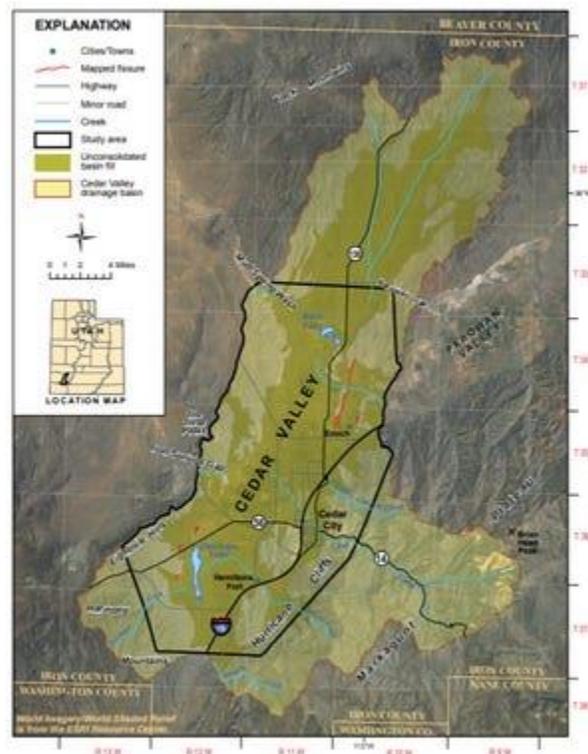


Figure 1. Cedar Valley study area showing location of known earth features in relation to major physiographic features.

Knudsen said he has good evidence from visual surveys he conducted a few summers ago that “a significant amount of subsidence is occurring” in Parowan valley. He found evidence of new fissures as well as several protruding wellheads. But, he said, there has been no funding to investigate further.

“We’ve been pretty lucky so far that it’s been mostly in these farm areas,” Knudsen said. “But as it encroaches closer to develop areas, and of course, as development kind of spreads out into these areas, we become more susceptible to these fissures and subsidence. And, you know, that the hazards are pretty obvious. If you happen to be right on top one of these earth fissures that is displacing at the surface, it puts a lot of stress on whatever structure is above it.”

This could limit growth, a major contributor to the Cedar Valley economy, for areas near these fissures. According to Dotson, Enoch City has grown by about 10% over the past ten years, to a current population of nearly 7,000 people. The failure of the Parkland subdivision was a loss for the whole community.

“If we went back and looked at the potential property tax revenue, I’m sure it was substantial,” Dotson said. “The bank and the developer are both out of business now.”

Others might argue that the fissures could be nature's way of putting a check on recent rapid growth in Iron County. With every new resident, water needs in the valley rise and the demands on the aquifer become even more strained, the risks for subsidence looming closer.

Dotson said that Enoch City is constantly trying to get people to reduce water use, through education campaigns and zoning to reduce the size of lots so the temptation to water large lawns decreases.

"It's going to be a long-term fix. And it's not an easy one because people still want to use water," said Dotson.

Enoch city offers free water use consultations by specialists from the Utah State University extension program. Anyone can call to set up a visit, Dotson said, where a specialist will come out to your house and tell you how you might be able to use less water and help slow down subsidence.

"There's no way to permanently heal or fix a fissure," Knudson advised. "But if you stabilize groundwater levels, there may be a lag, but the fissure will stop growing. As long as you can guarantee that you will keep groundwater levels stable, development and putting in utility lines might be reasonable."