

# Researchers map springs across the Mojave Desert

*Study of 300 desert springs will provide ‘baseline’ to track impacts of climate change*

**Ian James and photographs by Marilyn Chung, The Desert Sun, 4-18-16**

Bouncing down a rocky road in a pickup, two researchers neared their destination: an oasis of palm trees in the desert.

When the unpaved road ended in an impassible collapsed section, they stepped out and continued on foot. Andy Zdon said the approach to this spring was relatively easy. Over five months, he has often had to trek to remote spots while carrying out an exhaustive study of the natural springs across the entire Mojave Desert — an undertaking that has never before been done on this scale.

“I have been living and breathing the desert since September,” Zdon said with a smile. “I’ve done about 300 miles of walking to these springs. We’ve had to do a lot of walking.”

At each spring, Zdon, a hydrogeologist, has collected data about how much water is flowing from the ground and has analyzed the dissolved oxygen content and other properties of the water. The results will enable scientists to monitor changes in the springs, which are critical for wildlife, and document influences such as declines in groundwater levels due to pumping, shifts in flows due to weather cycles, and the drying of springs as a result of climate change.

“If you’re going to try to understand the effects of climate on a system, you need a starting point. You need a baseline, and that’s what this is doing,” Zdon said.

“You can’t even begin to understand whether you’re seeing the effects of climate change if you don’t know what the conditions were before you started looking for it, and that’s really the crux of it,” Zdon said. “You can’t manage or identify an impact if you don’t know what your starting point is.”

Researchers have carried out a census of springs across the Mojave Desert in order to collect data that will enable them to spot changes in the future. Marilyn Chung/The Desert Sun

His study is funded through the Transition Habitat Conservancy, a nonprofit group that obtained a \$190,000 grant from the U.S. Bureau of Land Management to carry out surveys of springs across the Mojave Desert.

Working alongside Zdon was Patrick Donnelly, a biologist and executive director of the Amargosa Conservancy, who was helping to take notes. He walked around the spring and rattled off a list of the plants he found: California fan palm (42 of them), honey mesquite, oleander, date palm and willows, among others.

Zdon spotted birds including a black-throated sparrow, house finches and white-crowned sparrow. They took down all of those details in their notes.

“The springs in the desert are really the beating heart of the desert,” Donnelly said.

Animals ranging from bighorn sheep to hummingbirds depend on the water holes. Zdon has also seen signs of other animals including mountain lions, bobcats, coyotes and badgers.

If some of the isolated springs and wetlands dry up as the climate heats up, the animals that depend on those water sources could disappear.

Data on desert springs has been collected sporadically over the years, but not in a systematic way.

“So this is really meant to be a baseline for the entire desert,” Donnelly said, “to understand the water in this desert and how we can protect it.”

During their outing in February, the two visited springs in California’s Amargosa Basin, an area rich in wildlife east of Death Valley National Park and a short drive from the Nevada border. Zdon was nearing the end of his study, which covers a total of 312 springs.

“This is number 296 since September,” Zdon said as he began his work at Chappo Spring.

Around the lush vegetation stood the ruins of a homestead abandoned years ago, an old chicken coop and the rusty skeletons of cars. Zdon said that decades ago, people grew crops and raised livestock at the spring.

Many of the springs he has surveyed are on federal lands, and his research will provide the Bureau of Land Management with information that can be used to make decisions about how different areas are managed.

Zdon walked into the thicket of palm trees to get closer to a pool of water. He pulled out an instrument to test the water, and he read off the pH, temperature and total dissolved solids while Donnelly took notes.

“Wow, this is the best water we’ve seen,” Donnelly said.

“Yeah, it’s pretty good water,” Zdon replied.

But Zdon said the spring’s flow has declined dramatically from 1928, when a U.S. Geological Survey report stated that it was flowing at about 80 gallons a minute. Zdon said he had measured the flow a couple of months earlier and found the spring was discharging about 8 gallons a minute.

“Now it’s essentially just a freestanding puddle and we can’t even see flow,” Zdon said. He noted his observations about the spring on a form for the BLM: “functional, at risk, with a downward trend.”

Hydrogeologist Andy Zdon places a device in a spring-fed pool to measure the dissolved oxygen content and other properties of the water.

(Photo: Marilyn Chung/The Desert Sun)

Some springs have completely [dried up](#) elsewhere in the California desert. And while it’s challenging for researchers to differentiate between the effects of climate change, groundwater pumping and natural drought cycles, all of those influences are likely affecting springs.

“No two springs are alike,” Zdon said. At this spring, he said, the decline in flow might be related to decades of overpumping the aquifer around the nearby town of Pahrump, Nevada, as well as years of drier conditions in the area.

Zdon has been compiling the results of his research for a report that will be released later this year.

Near another spring, Donnelly pointed out ancient grinding holes in the rock, apparently left behind centuries ago by Southern Paiute Indians who depended on the spring.

He said some of the locals in the area have said there used to be a creek flowing from the spring. Now it's a small water hole next to a cottonwood tree and a thicket of mesquite.

"I'm going to take a water sample here," Zdon said. He collected the water in a small glass bottle and put a label on it. The sample, he said, will be sent to a lab for isotope analysis, which can indicate whether the spring water fell as rain or snow and in which area the water seeped down into the ground.

Nearby, he pointed out a pipe sticking out of the ground: a monitoring well that was installed to keep track of water levels.

The data Zdon has collected at the springs could also help conservation groups such as the Transition Habitat Conservancy target areas to protect. The Nature Conservancy also provided funding to support the research.

As he walked around one of the springs, Zdon said excitedly: "That's a long-eared owl!" It soared off a tree branch and disappeared. Moments later, Zdon stopped to listen to a squeaky chitter. "That's a hummingbird!"

"This is one of my favorite places on Earth," Donnelly said. "When I need a break from the world, I come out here and put a chair underneath that cottonwood."

Donnelly said the huge effort involved in surveying the springs will pay off by producing valuable information about the conditions on the ground today, which will in turn help people spot the influences that will affect the springs in the years to come.

"These springs are very important because they're very much indicators of the health of our aquifer," he said. "Because we're dealing with such an understudied resource, you know, we're really developing those baselines as we speak."