



Abraham Perez tests irrigation tape on a newly planted alfalfa field at LKH Farming's Urrea Farm near Wenden. MARK HENLE/THE REPUBLIC

ARIZONA'S NEXT WATER CRISIS

Megafarms and deeper wells are draining the water beneath rural Arizona – quietly, irreversibly

Ian James and Rob O'Dell, Arizona Republic

<https://www.azcentral.com/in-depth/news/local/arizona-environment/2019/12/05/unregulated-pumping-arizona-groundwater-dry-wells/2425078001/>

Vast expanses of lush green fields are multiplying in the Arizona desert, forming agricultural empires nourished with billions of gallons of groundwater in the otherwise parched landscape.

Arizona's groundwater levels are plummeting in many areas. The problem is especially severe in unregulated rural areas where there are no limits on pumping. The water levels in more than 2,000 wells have dropped more than 100 feet since they were first drilled. The number of newly constructed wells is accelerating, and wells are being drilled deeper and hitting water at lower levels.

This free-for-all is draining away the water that homeowners also depend on, leaving some with dry wells.

As the groundwater is depleted, Arizona is suffering permanent losses that may not be recouped

for thousands of years. These underground reserves that were laid down over millennia represent the only water that many rural communities can count on as the desert Southwest becomes hotter and drier with climate change.

Unfettered pumping has taken a toll on the state's aquifers for many years, but just as experts are calling for Arizona to develop plans to save its ancient underground water, pumping is accelerating and the problems are getting much worse.

Big farming companies owned by out-of-state investors and foreign agriculture giants have descended on rural Arizona and snapped up farmland in areas where there is no limit on pumping.

Buying property from struggling small farms and homeowners, they've drilled wells a thousand feet deep or more, often spending more than half a million dollars per well to irrigate tens of thousands of acres of hay, corn, pistachios and other thirsty crops, with the expectation that they'll soon be raking in profits.

In unregulated rural areas where water tables are dropping, homeowners and politicians are calling for the state to step in to halt well-drilling, or create new rules to limit pumping.

In these predominantly conservative communities, where the ethos is to take care of yourself and be wary of government regulation, prominent local officials are suggesting a moratorium on drilling, or the formation of new managed areas where drilling would be restricted.

Even urban areas of the state where protections exist are facing major challenges. Years of drought, rapid growth and cutbacks in Colorado River water are increasing the pressures on groundwater in areas that fall under state regulation.

In an unprecedented examination of the state's groundwater, The Arizona Republic analyzed water-level data for more than 33,000 wells throughout Arizona, including some records going back more than 100 years, and nearly 250,000 well-drilling records.

The investigation found the water levels in nearly one in four wells in Arizona's groundwater monitoring program have dropped more than 100 feet since they were drilled, a loss that scientists and water experts say is likely irrecoverable.

Nearly half of the wells with five or more measurements have dropped more than 50 feet at some point since record-keeping began. And that's only in a limited number of wells whose owners agreed to be voluntarily monitored.

Arizona doesn't require meters on wells in many areas, meaning no one really knows how much water is being pumped out.

Tom Buschatzke, director of the Arizona Department of Water Resources, said the lack of metering is a major hole in Arizona's groundwater laws. He said his department has proposed mandatory water-use reporting by well owners in unregulated areas. That data would enable the agency to see precisely how much water is being taken out of aquifers.

"We need that pumping data," he said.

Many of the industrial farms have located themselves in the rural areas that have already seen the largest water-level drops over time.

Arizona water consultant Marvin Glotfelty said it's difficult to determine how much the corporate farms have additionally dropped the aquifers without building complex groundwater models

that can cost as much as \$50,000.

“In our firm, what we are having farmers come and ask us is, ‘Is there enough water for X period of time?’” Glotfelty said. “And if we say, ‘OK, there’s enough water to last 50 years, and it’s going to result in several hundred feet of water level drawdown,’ we give them that answer and they’ll go forward with their farm.”

These farmlands, which are forming circular islands of emerald green in the desert, are swiftly draining aquifers. People who live nearby are increasingly living in fear that their water may soon run out.

Some wells have already gone dry, leaving families struggling to cope with the costs.

Rodney Hayes’ well went dry in July, as his wife, Nancy Blevins, was washing the dishes. Their pump burned up when the water level dropped, and the two, who live near a giant Saudi Arabian hay farm in Vicksburg, had to look for water elsewhere.

They hauled water, 100 one-gallon bottles at a time, from a friend who lent her tap. They dreamed about getting water back on for even a few hours a day.

“At least we could take showers without going to friends’ houses or truck stops or, you know, pouring water over each other,” he said.

In November, they finally managed to buy a new pump and got water running at their home again. But there’s no telling how long it might last.

Regions where pumping isn’t restricted — from Mohave and La Paz counties in the west to Cochise County in the southeast — have become hotspots where groundwater is being quickly depleted.

While the water tables drop year after year, the political system seems paralyzed and incapable of limiting pumping or helping residents who are saddled with the costs.

So the status quo stays in place: Large farms continue to pump out vast quantities of water. Homeowners continue to bear the costs. And this irreplaceable supply of water continues to drop.

Long-term problem getting worse

The largest drops in groundwater levels have occurred over decades, in valleys where farms have been drawing on aquifers for 70 years or more.

Some areas of the state have dropped so much that the water likely won’t naturally recover in our

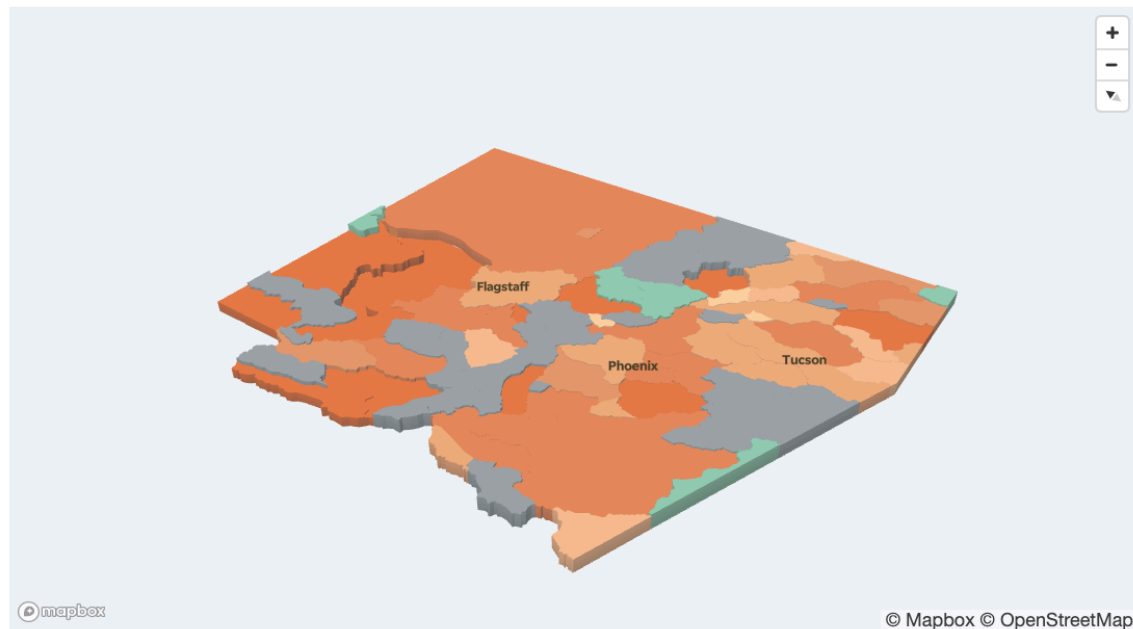
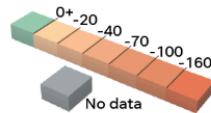


Nancy Blevins carries plastic bottles of water in August into her home near Vicksburg. MARK HENLE/THE REPUBLIC

Arizona average water levels from 1950s to today

Click on the map to see changes between average water levels in wells in different subbasins across Arizona. You can toggle to see changes in average groundwater levels between the 1950s and the 2010s, or since the 1980s, when Arizona's Groundwater Management Act took effect.

Change in average groundwater levels in feet since the 1950s ▼



SOURCE Arizona Department of Water Resources, Arizona Republic research

CREDIT Rob O'Dell, Arizona Republic and Mitchell Thorson, USA TODAY

lifetimes. The McMullen Valley, surrounding Salome and Wenden in the desert about 40 miles northeast of Quartzsite, has seen the average water level in state-monitored wells drop by 184 feet since the 1950s. The average well in the Gila Bend basin has dropped by 162 feet.

In Pinal County, in the Maricopa-Stanfield basin around Maricopa, monitored wells have declined by 125 feet since the 1950s. In the area around Vicksburg, where the 10,000-acre Saudi hay farming operation opened five years ago to ship hay back home, the average water level has dropped 120 feet since the '50s.

In the “active management areas” that were created by Arizona’s landmark Groundwater Management Act in 1980, average water levels have stopped falling and recovered somewhat after Colorado River water was brought by canal in the 1980s and 1990s

But in rural areas without regulation, average water levels across all monitored wells in the state have dived in recent years and are threatening to surpass all-time lows hit in the mid-1980s.

State officials estimate that 40% of the water that’s used in Arizona is groundwater.

Robert Glennon, a water expert and law professor at the University of Arizona, said the sharp declines in groundwater levels are alarming.

“Those are big numbers, and it’s probably not reversible,” Glennon said. “A 50 or 100-foot drop



Rodney Hayes stands next to his well at his home near Vicksburg. The pump failed in July when the water level dropped. MARK HENLE/THE REPUBLIC

is a big drop. And that makes it much more expensive for everyone to use what water there is.”

In those unregulated rural areas of the state, the overuse of water is getting worse. Large commercial farms are ramping up, drilling wells and pumping billions of gallons from stressed aquifers every year.

“They go to the place where there’s no regulation, because they can just suck the hell out of the water and leave,” Glennon said.

With water tables falling, state drilling records show that more and more wells are being drilled, and they’re being drilled deeper. The wells in the overstressed Willcox basin were drilled 358 feet deeper on average in 2018 than they were in 2010. Nearby in San Simon, wells were 211 feet deeper.

In the Wellton-Mohawk basin, which straddles Interstate 8 on the way to Yuma, the average well was drilled 741 feet deeper in 2018 than in 2010. In the Hualapai Valley around Kingman, where large corporate farms have spurred calls for regulation, wells were drilled an average of 280 feet deeper than eight years ago.

There are no state or national standards that determine how big a drop in a well is problematic. The only standard Arizona has for wells is a rule inside managed areas that a well cannot be built if it will drop a neighbor’s well by more than 10 feet over five years. Applying that standard to all monitored wells statewide reveals that 20 percent of wells dropped more than that during at least one five-year period.

In many areas, there are only rough estimates of how much extractable freshwater remains underground, and it’s unclear how much longer overpumping could continue until aquifers approach a point where the remaining water is too deep to pump economically.

“My concern is really about the future,” said Jay Famiglietti, who leads the Global Institute for

Water Security at the University of Saskatchewan. “How long can it really go on before, in the case of Arizona, the water is gone?”

Famiglietti, a former NASA scientist, has used measurements from satellites to study groundwater worldwide, and has found that many of the world’s large aquifers are declining.

Groundwater levels have been falling in many areas across the United States, and the problem has been especially pronounced in farming areas of the West, from the productive nut and fruit orchards of California’s Central Valley to the cornfields atop the Ogallala Aquifer in the High Plains.

The plunging water levels in unregulated parts of Arizona parallel similar declines in other Western states. But the state’s water data shows that the problem has been worsening with the arrival of industrial farms and investors.

And people who live near the expanding farmlands are paying a heavy price.

‘I don’t feel safe’

For companies growing crops like alfalfa and corn, Arizona offers economical land, a sunny climate with several growing seasons, and cheap, readily available water from wells. As these farms pump more water, the collective costs are passed on to neighbors and homeowners. While the water tables decline beneath their homes, wells have been going dry.

Several years ago, as alfalfa farms expanded into virgin desert and fallow farmland around the town of Salome, Mary Goodman’s well suddenly dried up.

Goodman, a 71-year-old retired nurse, and her husband, Bill, a retired mechanic, spent \$16,000 of their retirement money drilling a new 680-foot-deep well. Now they worry about how long the water will last.

“Half of me feels like we ought to just sell out now, if we can get a good price, and get the heck out of here before we run out of water,” Goodman said. “The other half says, ‘you love it here. You’ve worked for 20 years to build this place up.’ So I don’t think I should be forced to sell my home just to feel safe. But I don’t feel safe.”

Near the Goodmans’ house, where there are two dirt runways for Bill’s aviation hobby, new industrial wells have been drilled beside Highway 60. Goodman said all the pumping in McMullen Valley is gradually taking a toll on their well.

“The only comforting thought is by the time it goes dry, we’ll probably be dead — if that’s a comfort,” she said.

She said it’s upsetting and scary to see the place where she planned to live out the rest of her life being drained of its water, and nobody doing anything about it.

“I think it looks very grim if something isn’t done to start protecting the water in this area,” Goodman said. “There need to be some laws put into place to protect the water.”

In her town and elsewhere in the state, calls for regulation have been growing. People have been clamoring for politicians and water officials to act to safeguard groundwater before it disappears.

More than 50 miles south of Goodman’s home, in the remote desert straddling the Maricopa-Yuma County line, a ghost town stands as a reminder of the potential consequences of unchecked

groundwater pumping.

An abandoned hotel, with its windows boarded up, lies at the base of a rocky hill. This was once a popular hot spring resort, an oasis for travelers to stop and rest.

The Agua Caliente hot spring has a history that goes back well before Arizona became a state, said Matt Bischoff, a historian who has studied the area.

A Spanish mission was built there in 1774 and in the 1800s the springs became a resort for people traveling by horse and stagecoach along the trail that followed the Gila River.

In the 1860s, noted author John Ross Browne wrote about a visit in the book “Adventures in the Apache Country.” He wrote: “An abundant supply of water flows ... We had a glorious bath in the springs next morning, which completely set us up after the dust and grit of the journey.”

The 22-room hotel was built next to the hot springs in 1897, Bischoff said. During World War II, troops trained nearby at Camp Hyder and swam in the springs.

Now, if you drive down Old Agua Caliente Road in Hyder, you’ll find “No Trespassing” signs posted on the shuttered hotel. Near it, the remnants of wooden buildings are splintering and decaying in the sun.

The road near the Agua Caliente ghost town is lined with dead mesquite trees. Their roots no longer reach the water, and their branches have been transformed into brittle charcoal-gray skeletons.

The hotel shut down after the war, when the completion of the highway allowed drivers to bypass Agua Caliente. But it was groundwater pumping from farms, Bischoff said, that drew down the water table and dried up the springs.

“The overpumping is what killed it off completely,” Bischoff said.

Arizona politics offers little hope for fix

Nearly 40 years ago, Arizona adopted a landmark law regulating groundwater in Phoenix, Tucson, and populated, mostly urban areas. The law left the rest of the state without rules limiting drilling or pumping.

“Outside of the active management areas, you can drill a well of any size, and any place you want, and pump as much as you like,” said Kathleen Ferris, the former Department of Water Resources director who helped draft the Groundwater Management Act.

But there’s only been one addition to regulated areas since the groundwater law was approved, and that expansion occurred in 1981. Five recent efforts to limit groundwater pumping in three different counties — Cochise, La Paz and Mohave — have failed.

There is little the Arizona Department of Water Resources can do under the law to limit groundwater pumping.

“So the only thing that they can do outside of (managed areas) is to require that wells be drilled in conformance with well construction standards and by a licensed well driller and that they’d be registered with the department,” said Ferris, now a senior research fellow at Arizona State University’s Kyl Center for Water Policy.

The Department of Water Resources can also create new managed areas of the state, either by declaring the area itself or establishing one if enough landowners sign petitions. But three recent efforts to create new managed areas, one in San Simon near Willcox and two efforts requested by leaders in Mohave County, were rejected by the state.

State officials said that in those cases water levels weren't dropping rapidly enough to create a new managed area and they couldn't take into account potential future increases in pumping. ADWR director Buschatzke ruled the state would have to wait to see even larger declines before putting in new regulations that would create an "irrigation non-expansion area" that would freeze new irrigation.

"I'm definitely constrained by the law, I only have the authority to do certain things," Buschatzke said. "We can only look at today and yesterday in terms of decline rates."

In 2017, Buschatzke's department proposed new legislation that would give the agency the ability to project water availability decades into the future when making decisions on limiting irrigation.

The package of new rules also called for metering of wells outside managed areas. Buschatzke said the department couldn't get any legislators to take up the bills.

"That's our challenge, how to build up enough support among the stakeholders that we can get something passed at the Legislature," he said.

In addition, the calls for regulation led to a surge in well-drilling around Willcox. Completed wells surged from 43 wells in 2010 to 123 wells in 2015.

State lawmakers have declined to establish new regulations.

Legislators declined to wade into a 2015 effort by community leaders in Willcox for voluntary regulation to limit groundwater pumping there, which ultimately failed. Requests to limit wells from large corporate farms in La Paz County and prevent new irrigated farms in Mohave County were met by the Legislature with an allocation of \$100,000 to create study groups to examine aquifer levels there.

It's unclear how many wells across the state have gone dry in recent years, because neither state officials nor county officials have been systematically tracking reports of dry wells — even though they've been getting regular complaints.

Bruce Babbitt, the former governor who signed the 1980 Groundwater Management Act into law, is calling for the state to regulate groundwater in rural areas and give county officials a leading role. In a speech in October, Babbitt said problems are mounting in unregulated rural areas.

"What we're seeing is a rise of industrial agriculture on a scale that we've never seen in this state, from New York hedge funds, from Nevada investors, from Middle Eastern investors," Babbitt said. "That industrial agriculture is just the beginning, I submit to you, of a new era of intense, unprecedented demand."

He pointed to the arrival of big corporate farms in Mohave, La Paz and Cochise counties.

"Mark my words. It's just the beginning," Babbitt said.

Four decades ago, the political situation was much different. When the Arizona Legislature passed the nation's first comprehensive groundwater management law, there was a genuine crisis. A ruling by the Arizona Supreme Court had upended the state's water rules four years earlier

and the state faced the threat of losing Central Arizona Project water if it did nothing.

“We had leadership in the Legislature that believed it had to happen and had a governor who also believed it had to happen,” Ferris said.

Gov. Doug Ducey didn’t respond to repeated requests for comment on Arizona’s water issues. Ducey’s Water Augmentation, Innovation and Conservation Council has a committee on rural groundwater outside of regulated areas. That committee is headed by Rep. Gail Griffin who at least five times in the past four years has tried to loosen groundwater regulations. She also did not respond to requests for comment.

Ferris said for real change to happen now, the Legislature must get involved again. But unless they do, Arizona’s paralyzed system continues the status quo, with homeowners bearing the costs of failing wells and large farms continuing to pump with no limitations.

“Unfortunately the people that have control of the status quo don’t want it to change,” Ferris said.

Draining fossil water

In the dusty fields near the dry bed of the Gila River in Hyder, not far from the Agua Caliente ghost town, drilling rigs are boring deep into the ground.

Companies have been buying land to lease to hay growers, and they’re putting in new wells more than 1,500 feet deep, creating Arizona’s next agricultural frontier for industrial farms.

Mark Skousen runs a second-generation family farm near the abandoned hot spring in Hyder. When his father bought the land and drilled a well in 1957, the water gushed out of the ground. At that time, the Agua Caliente hot spring was still flowing.

In the early 1960s, when Skousen was a boy, another farmer drilled wells at a farm near the hot spring. When they started pumping, the water quit flowing out of the ground and the hot spring died.

“The water table’s been dropping steady since then,” Skousen said.

Some of his wells no longer produce enough water and he has had to reduce the number of acres he farms.

In the long term, the water losses may be irreversible in many rural communities. Much of the groundwater that’s flowing to farmland accumulated underground thousands of years ago. As it’s pumped out, the aquifers are suffering a hollowing-out that the rains won’t replenish for centuries to come.

In a few areas of the state, aquifers have been replenished by years of “banking” imported water from the Colorado River, and there, groundwater levels have risen.

But even in “active management areas” around Phoenix, Tucson and Pinal County, where aquifers have benefited from decades of regulation, there still have been significant declines in some areas. In more than half the subbasins in managed areas, average water levels have declined since the 1980s even with restrictions on groundwater pumping and additional CAP water.

Arizona faces its first-ever mandatory cuts in Colorado River water next year under an agreement that will shrink the amount of water that’s available to replenish aquifers in urban areas. And in the long-term, with climate change projected to put growing strains on water supplies from riv-

ers, Phoenix and other cities plan to potentially pump more groundwater.

Groundwater also feeds desert streams and rivers, and decades of heavy pumping has left them with diminished flows. The future of remaining rivers, from the San Pedro to the Verde, hangs in the balance.

Overpumping can also drive up costs.

At deeper levels, groundwater can contain higher levels of contaminants, which can require expensive treatment. And the deeper the water table falls, the more energy costs increase to pump the water out.

If nothing changes, Ferris said, “either the groundwater runs out, or it becomes too expensive to pump, or its quality is such that it’s too expensive to treat to use.”

*Environmental coverage on azcentral.com and in *The Arizona Republic* is supported by a grant from the Nina Mason Pulliam Charitable Trust. Follow *The Republic* environmental reporting team at environment.azcentral.com and [@azcenvironment](https://www.facebook.com/azcenvironment) on Facebook, Twitter and Instagram.*



There are about 75,000 animals at the Coronado Farms dairy near Willcox, and the company Riverview is in the midst of an expansion. MICHAEL CHOW AND THOMAS HAWTHORNE/THE REPUBLIC

ARIZONA'S NEXT WATER CRISIS

In southeastern Arizona, farms drill a half-mile deep while families pay the price

By Ian James and Rob O'Dell, Arizona Republic

<https://www.azcentral.com/in-depth/news/local/arizona-environment/2019/12/05/wells-drying-up-around-willcox-where-effort-change-groundwater-rules-failed/2357906001/>

Richard Wilson was in his kitchen making coffee and getting ready for work one July morning when he heard his wife, Julie, call out from the shower.

She had just finished rinsing off when the water stopped.

“I started hollering for him: ‘We ain’t got no water! What’s wrong with the water?’” she said. “I didn’t know what was going on.”

He went to the sink and turned on the faucets. Nothing came out.

He went outside their home in Cochise, where pine trees tower above their lawn, and frantically flipped the switches on their pump. It started briefly, then cut out again.

Unable to get water for days, they started to haul it in buckets from their restaurant in nearby Sunsites.



After Richard Wilson's well ran dry in July, he bought a 2,500-gallon tank and started paying for water deliveries. MARK HENLE/THE REPUBLIC

They later hired a technician to install a new pump. He suggested first checking the water level and lowered a probe to the bottom of the well.

"They went down 387 feet. Not a drop of water," Richard Wilson said. "So, at that point you're like, 'Now what do I do?' I've already been a week without water, having to haul water home from town so that we can take showers with buckets."

They were able to buy a 2,500-gallon tank. The couple began paying \$300 a pop for someone to haul water to the property. A full tank could last a few weeks as long as they rationed it and didn't water their trees. They watched their prized peach trees wither.

They considered drilling a deeper well, but they were concerned they couldn't afford it.

They maxed out their finances to buy the home last year, and they had heard a driller might charge them \$30,000 to \$50,000 for a new well. But no driller would guarantee how long a newly drilled, deeper well would last. They saw no other option but to continue hauling water.

A growing number of families have been struggling with dry wells in the farming towns around Willcox in southeastern Arizona. Groundwater levels have been dropping for years as large cattle operations, cornfields, pistachio groves and other farms have pumped out billions of gallons of groundwater.

The farms, along with vineyards and wineries, have moved in to take advantage of the year-round sunshine and ample farmland.

Though the arid Willcox area averages 12 inches of rainfall a year, the farms have access to huge amounts of groundwater. There is no restriction on how much they can pump out of the ground.

Big farms around Willcox draw on wells as deep as 2,500 feet. As they do, water levels throughout the area are plummeting and homeowners' shallower wells are increasingly going dry. As the

water is pumped out, the ground is sinking. As the earth settles, fissures are gouging cracks in the roads.

Farms and other well owners are pumping more than four times as much water as the estimated natural recharge that goes into the ground in an average year, according to data from the Arizona Department of Water Resources.

Some farmers acknowledge the problem.

“The best-case scenario, we’re sucking out four times as much as we’re putting in,” said John Hart, president of the Cochise County Farm and Livestock Bureau. “To me, that’s something that’s just an irrefutable fact. You can argue about the numbers, but I think everybody has to agree that we’re sucking more out than is going back in. Well levels in general are dropping, and at some point in the future, it’s going to be a major problem — and for some guys it already is.”

Though groundwater levels have been in decline for years, drilling isn’t slowing down — it has accelerated in the past 10 years, according to an Arizona Republic analysis of state well-drilling data.

In 2015, 123 new wells were completed in the Willcox basin, compared with 43 in 2010.

The wells are also being drilled deeper. The average depth of all wells was 358 feet deeper in 2018 than it was in 2010.

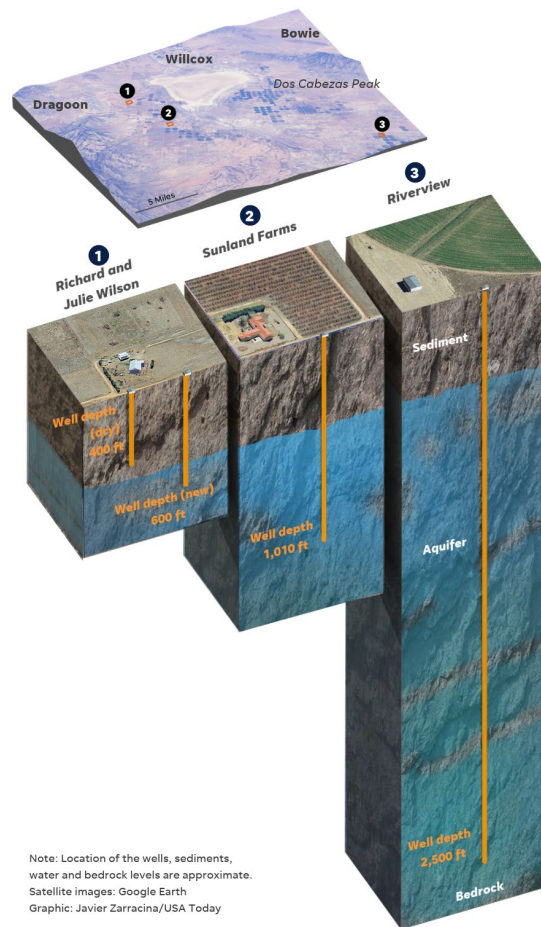
Recognizing the situation’s peril, a group of farmers, homeowners and business people got together in 2015 to talk about how they could address the problem. They came up with a locally led proposal to manage water and conserve it on farms.

But their proposal failed to win enough support and in 2016 the effort was abandoned after fruitless meetings with members of the Arizona Legislature.

The push left bitter divisions. And more than three years later, the community remains divided and is miles away from mounting any collective response to combat the rapid declines in groundwater levels. A petition from local water users asking the Department of Water Resources to form a new managed area in nearby San Simon also ended in acrimony.

Alan Seitz, one of the leaders of the 2015 effort in Willcox, said he has stepped away from trying to fix Willcox’s water situation because of how it divided the community.

“It pit neighbors against neighbors, that have been maybe lifelong friends for 40 or 50 years, and all of a sudden now they’re at odds,” Seitz said. “We took enough grief over that thing that I just





Farmer John Hart stands on a center-pivot irrigation system on his farm, where groundwater levels have been declining. MARK HENLE/THE REPUBLIC

kind of quit talking to people about it. ... There just wasn't the support, so that was a chapter that I just wanted to put behind me."

The political inaction has locked in the status quo. Farms keep pumping. Groundwater keeps disappearing. And homeowners with dry wells keep asking for help that isn't coming.

'It can't go on forever'

Anyone wanting to understand why the Wilsons struggled to get help with their well should talk to Peggy Judd, the Cochise County supervisor who represents the area.

About 20 people have complained to her office about wells that have dried up, she said. But she doesn't sound particularly sympathetic to the plight of her constituents, saying that many of them don't understand what it's like to live in a rural area with the uncertainty of a well. A well, she said, is "not guaranteed to work forever."

Many of the wells are failing, she said, because they are shallow wells that were drilled 20 or 30 years ago.

Judd said she strongly supports the agriculture industry and farmers. She dislikes the idea of requiring growers to put meters on their wells. And until recently, she opposed the idea of placing any restrictions on well-drilling or groundwater pumping.

In an interview in August, she said her gut feeling was that it wasn't yet time for intervention. She said she was worried that if restrictions on drilling were put in place, they may never be lifted.

"You take our ability to farm away, what happens when it starts raining?" Judd asked. "Maybe in another 10 years down the road, when we're getting a little more desperate, people will come together."

In November, Judd said she had a change of heart after talking further with constituents and hearing former Gov. Bruce Babbitt appeal for counties to take the lead in managing groundwater.

Judd said she now wants to consider the possibility of establishing a managed area around Willcox to regulate groundwater. The current farms are fine, Judd said, but she has grown “a little bit more afraid of other people coming in that want to do large-production agriculture.”

Judd said she has heard from farmers and other constituents who would support steps to safeguard water supplies. She said even some of those who fought the 2015 effort are starting to come around to the idea.

“The local people that live here are saying we have to limit, we have to stop it somewhere. It can’t go on forever. And I get that now,” Judd said.

Tommy Hoover, a well driller who grew up in Willcox and owns Hoover Drilling Co. in Casa Grande, said there have been many cycles when farmers in Willcox pumped out too much water from the aquifer and then found themselves hit by drought. He said people sold their farms or simply walked away from them.

“In the past, people couldn’t afford to chase the water,” he said. “This time is a little different. People aren’t leaving. ... They are drilling more wells.”

Willcox is a closed basin encircled by mountains, without any major river that runs in or out. The entire basin drains into a large dry lake just south of Willcox. Other than local rain and snowmelt, there is nothing to recharge the underground water supply.

The farms that rely on this limited supply of water have expanded dramatically over the past decade. The amount of harvested farmland acres in Cochise County increased by 34 percent from 2012 to 2017, according to federal agriculture figures, growing from 65,277 acres to 87,417 acres.

Hart, the farm bureau president, moved from Phoenix to Willcox about 13 years ago when he bought his farm. Even then, he knew Willcox had water issues. But over the last decade, Hart has seen the water levels in his wells decline, requiring him to rework his pumps and grow less than he wants to on his 870-acre farm.

“Am I worried about, is my son going to be able to farm the farm that he grew up on? Yes, I am. Do I know what to do about it? No, I don’t,” Hart said. “You know, let’s face it: We’re sucking more out than we’re putting back in. That can’t last forever.”

He has grown alfalfa, corn and oats for the last few years, but he worries the water will continue to decline.

“The guys with the deepest pockets are going to drill the deepest wells, and can afford to pump them,” Hart said. “It’s survival of the fittest.”

Coping with dry faucets

The Wilsons bought their home in Cochise last year. The nine-acre property is flanked by pistachio farms, and the Wilsons, originally from Kentucky, were attracted by the country feel and the quiet. They put out plastic pools for their animals — dogs and ducks, a pig and a goat — and watered their fruit trees and pine trees.

When their well ran dry, they spent weeks hauling 5-gallon buckets and a 30-gallon drum to their

house in the back of their pickup from their family restaurant, Jules Pizza, in nearby Sunsites. The whole family, including the Wilsons' 19-year-old son, Caleb, helped lug the buckets to the house.

"I had to heat it up on the stove, and just take a cup and just get in the shower and shower off like that," Julie Wilson said. "You'd have to have water in the sinks to wash your hands and to brush your teeth."

After weeks with dry faucets, the Wilsons settled into a routine of rationing water. Before doing dishes or washing laundry, they checked the tank to see how much water they had left.

In addition to running the restaurant, Julie Wilson works at the post office and delivers mail, which leaves her hot and sweaty. She used to take two showers a day, one before work and another when she came home.

But she started skipping those showers. The Wilsons also stopped running the hose outside.

She said it pained her to see the rose bushes drying up.

"I have a great big, real pretty patch of grass out in my front yard that I just love. It's just as brown as it could be," she said, standing beside the counter in the restaurant in August. "And it's just stuff you take for granted. It just makes you really appreciate having water."

For Richard Wilson, it was hard watching his peach trees shrivel.

"I had peaches galore on my trees, limbs breaking because I had so many peaches, and now they're just drying up," he said. "All of it's dying."

He was rationing the amount of water he gave to his animals, putting less into the plastic pools.

Down the road from his house, he has seen water spraying constantly onto hay fields owned by a corporate farm.

"They can go deep enough to get as much water as they need. We can't," he said. "We have to haul water because the farmers beat us to it, I guess."

A colossal dairy in the desert

Several miles away, on the other side of the valley, the Minnesota-based company Riverview LLP bought the Faria Dairy in late 2014 on Kansas Settlement Road south of Willcox.

The company, known locally as Coronado Farms, keeps 75,000 animals at its existing dairy and is in the midst of a massive expansion to the south and east. The new operation, called Turkey Creek Dairy, has plans for 75,000 more cattle, said Kevin Wulf, Riverview's spokesman.

The company grows most of the food for the cattle on its properties, using a rotating mix of silage corn, wheat, and alfalfa. The crops are watered by about 200 center-pivot irrigation systems, which create giant green circles that stand out in sharp contrast against the surrounding dry ground.

Riverview now owns more than 37,000 acres in Willcox, according to a Republic review of property records. It's by far the biggest farm in the area, and is Riverview's biggest in the five states where it operates.



Thousands of plastic shelters for calves, called “calf huts,” spread out in rows at the new Turkey Creek Dairy. Riverview grows crops to feed the cattle at its dairies near Willcox, using groundwater to irrigate fields. MICHAEL CHOW AND THOMAS HAWTHORNE/THE REPUBLIC

The new Turkey Creek Dairy is stunningly vast, with cattle yards and 14,000 white plastic shelters for calves. The “calf huts” resemble large dog houses and spread across the desert in straight rows longer than football fields. The calves stay in the huts for 90 days so they don’t pick up diseases, and then they are moved into larger groups, Wulf said.

The dairy has 7,000 milk-producing cows and the rest of its animals are for “heifer replacement” — breeding cows for the dairy.

Riverview has expanded its operation by buying smaller farms. And its growing footprint has sparked alarm among homeowners who have been watching the water levels in their wells drop.

The Arizona Department of Water Resources, in its latest report on the Willcox basin, found so much water is being pumped out in the Kansas Settlement and Sunizona areas that several cones of depression — drawn-down portions of the aquifer — are “coalescing into a broader regional-scale groundwater depression.”

Monitoring-well data from the state shows 174 wells on Riverview properties that have multiple readings. Those wells averaged a drop of 80 feet from their maximum to their minimum readings, with 51 declining more than 100 feet. Sixteen of those wells fell more than 200 feet.

Riverview is not the cause of much of these drops as it only bought the property in 2014. But state drilling records show Riverview owns 420 wells in the Willcox area and 134 of those wells were started since the company bought the land. More than 90 of these wells are drilled to depths of more than 1,000 feet. Its deepest well is 2,500 feet deep.

“Ag pumping has been happening for decades and we’ve been in the valley for five years,” Wulf said. “So I don’t think this issue is completely on our shoulders.”

Wulf declined to disclose how much water the two farms use annually.

“No matter what the number is, it’s going to sound big,” Wulf said. “I’m not sure that it’s going to be presented in a way that is easily understood.”

Near Riverview’s green fields, Greg Freeman lives in a neighborhood with large lots in Sunizona, where for years many people have been seeing the water table decline.

Freeman tends a forest on his 11-acre property. He has a thicket of bamboo, as well as juniper trees, cypress, ponderosa pines and other trees. He calls it the Forest in the Desert Arboretum and Oasis, a name that’s emblazoned on signs next to his gate, partially obscured by a fast-growing prickly-pear cactus.

He has lived here since 1975. One of his wells, at 250 feet deep, went dry in 2000 after nearby farms installed center-pivot irrigation systems on land that had been fallow, and started up their pumps. Another well is 335 feet deep and is on the verge of going dry.

When that well goes kaput, Freeman will have one left. He had it drilled 554 feet deep in 2016.

“I drilled that new well in mind that I hope it lasts until I die,” Freeman said. “I’m hoping 25 years, but if the pumping continues like it is, it may not last that long.”

Freeman said just about everyone in his neighborhood is either out of water or has had to have a well drilled deeper.

“It’s been dramatic since about 2000, when the center-pivots came in,” he said, standing in his bamboo grove.

Freeman said he thinks it’s “insane” how deep the growers have been drilling for water. Looking at the costs and benefits of having such a concentration of farms, he said, the costs seem to far outweigh the benefits, while a small group of dairy owners are profiting.

“To me, the benefit of all these farms here is cheap dairy products and cheap meat. But at what cost?” he said. “Even if somehow we get them to stop or slow down, more than likely the water table will never come back up.”

Family faces stressful ordeal

The Wilsons continued to haul water through the summer and fall.

Paying to drill another well seemed fraught with pitfalls. On top of the cost, they were concerned there was no guarantee it would work.

“Even if I could borrow the money to drill a well, how do I know I’m going to hit water?” Richard Wilson said. “If I go 600 feet and I’m bone dry, I’m broke.”

The dry well became the family’s biggest financial dilemma.

“I don’t know how is the right way — to try to borrow money? Drill a well? Buy two more big tanks? Buy a tanker truck, haul my own water in? I mean, I really haven’t figured it out yet which way to go,” Wilson said. “It’s a crisis.”

He thought the lack of a working well could affect the property value.

As for the family’s finances, he said, “we’re tapped out.”

But in mid-November, the family had a stroke of luck. Wilson had been doing mechanic work, repairing a tractor for a man who owns a well-drilling rig. The man told Wilson he had heard his well was dry, and he offered to come look at it.

When he stopped by the house, he told Wilson he could drill another well for about \$8,000.

Wilson said he would have to wait a while to save up. But when the driller returned later to put in a well for a neighbor, he offered to come drill for the Wilsons, too.

The driller dug a 600-foot well, hitting water about 500 feet underground.

Wilson paid another specialist \$2,000 to reinstall the pump and connect the new well to the house.

Their faucets started flowing again.

The driller asked Wilson to pay the \$8,000 bill for the well when he can.

“I’ve just got to pay him whenever I get it,” he said. “He just did me a favor.”

*Environmental coverage on azcentral.com and in *The Arizona Republic* is supported by a grant from the Nina Mason Pulliam Charitable Trust. Follow *The Republic* environmental reporting team at environment.azcentral.com and [@azcenvironment](https://www.facebook.com/azcenvironment) on Facebook, Twitter and Instagram.*



Rodney Hayes and Nancy Blevins fill gallon containers of water at a friend's house in Bouse in September. Their faucets had stopped flowing in July. MARK HENLE/THE REPUBLIC

ARIZONA'S NEXT WATER CRISIS

In western Arizona, corporate farms turn water into profits, leaving small towns in the dust

By Rob O'Dell and Ian James, Arizona Republic

<https://www.azcentral.com/in-depth/news/local/arizona-environment/2019/12/05/salome-la-paz-county-residents-call-for-water-pumping-rules-amid-crisis/3792049002/>

It was a triumph for the eight-man Salome High School football team. Clad in all green uniforms except for white helmets and socks, the Frogs smashed opponent Mayer 60-0 in front of a raucous homecoming crowd.

Everything for the Frogs had come up green under the Friday night lights. Except for the football field they were playing on.

This gridiron was a patchwork of dying yellow grass marbled with large brown splotches of dirt. The only green to be found other than the Frogs' uniforms were small circles of grass around the field's sprinkler heads.

The high school has been asked not to water the field because the Salome Water Company won't have enough water pressure for residents to take showers or flush their toilets. And while the football field looks bad, it's better than the other sports fields the district barely waters at all.



Hay bales are stacked at Al Dahra Farms' McMullen Valley Ranch in Wenden.
MARK HENLE/THE REPUBLIC

There are signs that water is scarce all across this part of La Paz County. Household wells going dry. Corporate farms expanding into virgin desert. Massive industrial wells being drilled at a rapid clip. But almost nothing shows how water shortages have cut through everyday life in western Arizona better than Salome High's dirt football field.

Rep. Regina Cobb, R-Kingman, whose district includes the Salome area, said she was appalled by the conditions of the football field.

"What kind of injuries could these kids be getting by playing on a dirt field?" Cobb said. "There's no way this should be happening."

About 40 miles northeast of Quartzsite, the towns of Salome, Wenden and Vicksburg have long been farming communities where homeowners and farms peacefully coexisted. But something changed in La Paz County about five years ago: International corporate farmers moved in, expanded their operations to cover whole valleys, and drilled massive wells that pump out billions of gallons of water annually.

Farms long fallowed because they were not economically viable were tilled again. Pristine desert was converted to hay and alfalfa. Open warehouses sprouted up to shelter stacks of hay bales. Trucks zoomed down the dirt roads, billowing dust.

"I used to live in the middle of the desert, but now I live in the middle of a farm — a big huge farm — in the middle of the desert," said De Vona Saiter, the owner of Mas Paz, an eclectic general store in Wenden.

Near the farms, as people's wells have spat out mud and dried up, homeowners have been asking why no one is doing anything to help them. But what really enrages people, more than just drawing down a finite community resource, is who's doing it.

International farming conglomerates like Fondomonte, a dairy from Saudi Arabia, and Al Dahra ACX, a hay-grower from United Arab Emirates, have moved in. They have bought or leased thou-

sands of acres and are shipping alfalfa to Asia and back to the Arabian Peninsula.

Rodney Hayes and his wife, Nancy Blevins, who live near the Fondomonte hay farm in Vicksburg, watched their well go dry in July, and they blame the Saudi company and other nearby farms. They began filling their car with one-gallon water bottles and making trips to a friend's house to fill them.

Hayes said he resents foreign farms that get higher priority from politicians than residents.

"They're letting the big businesses take the resources that rightly belong to the homeowners," Hayes said. "The people in this county are getting screwed over for business."

The dropping water table and foreign involvement pushed more than 500 people in La Paz County to sign a petition in 2017 urging state lawmakers to immediately establish "some level of groundwater regulation," including metering wells, to address the problem of declining aquifer levels in Salome, Wenden, Vicksburg and Bouse.

La Paz County Supervisor Holly Irwin, who represents the area, has called for the state to prevent farms from drilling more wells.

Irwin turned over the petition to Gov. Doug Ducey's office and other state leaders. So far, the only change was a bill signed last year establishing two study committees to examine groundwater trends in La Paz County and Mohave County. Cobb said the \$100,000 earmarked in the bill isn't anywhere near enough money to study levels in La Paz County.

Irwin said none of her constituents likes government regulation, but she fears that if the pumping continues, the water will gradually be used up.

"They're shipping hay back to their country, and we see absolutely no benefit," Irwin said. "It bothers me that our natural resource is being used to help other countries, and we're not taking care of our own."

Without water, a family suffers

Walking to their front door, Nancy Blevins and Rodney Hayes carried as many one-gallon plastic bottles of water as they could hold. The backseat and trunk of their tan Toyota Camry were filled with more than 100 bottles. Gallon by gallon, they lugged the bottles inside.

This became their ritual three times a week. Since their faucets stopped flowing in July, they began driving 10 miles to a friend's house, filling up, and bringing the water home.

They quickly learned that cars aren't made to haul hundreds of pounds of water. On one trip, while crossing over train tracks and cattle-guards, they got two flat tires and had to call a tow truck. The weight stretched out the car's springs, leaving it sagging in the back.

They started spending more on gas and dreamed of taking a real shower, rather than using a ladder to pour water over each other in the bathtub.

Some days, their friend let them shower at her house. Other days, they showered at truck stops.

"It's kind of embarrassing you've got to rely on your friends and your community to get a resource that's yours to begin with," Hayes said.

He said the crux of the problem is that foreign interests keep pumping the water and there is no

regulation. He sees it getting worse.

“What’s this county going to do when these businesses dry up and they move to greener pastures?” Hayes said. “The corporations will move on and a lot of the residents will move on. But then what are you going to have here? A wasteland.”

Shortly before Thanksgiving, they managed to buy a pump and install it at a lower level in their well than the pump that burned up. The water is back on but there’s no telling how long it might last.

They don’t plan to dig a new well because they can’t compete with the farmers’ deep pockets and ability to keep drilling deeper.

Blevins said it’s outrageous that the Saudi company can keep pumping and growing hay for its cows, while the community is drying up.

“They’ve got no water over there” in Saudi Arabia, she said, “so they’re over here buying up in our country.”

The first sign of a problem at Blevins’ house was low water pressure. Blevins was washing dishes when the faucet suddenly stopped running.

She began driving about 60 miles to do laundry in Wickenburg.

All the errands have strained the family’s finances and taken a physical and emotional toll.

At night, when they sit outside on their porch, they can hear pumps humming at a farm across the road. The field is mostly dry, but they’ve seen pipes running off the property, and they presume the water is going to another farm nearby.

“I just get so ticked off,” Blevins said. “Sometimes you go to bed crying.”

Foreign firms move in and change area

In 1986, the city of Phoenix bought 12,900 acres from farmers in McMullen Valley, located off Highway 60 between Interstate 10 and Wickenburg. City officials calculated the groundwater could one day be transported to Phoenix to supplement its water supply.

For years, the city sat on the land and leased it out to farmers. But during the economic downturn in 2012, the city offered the land for sale. International Farming Corporation, based in North Carolina, outbid competitors and bought the land for \$30 million.

The company has been leasing out land to other businesses, including Al Dahra, a global farming giant based in the United Arab Emirates. The company now farms about 3,000 acres along Highway 60 in Wenden, where lines of trucks often roll away loaded with hay bales.

Some of the hay ends up feeding cows in American dairies. Other hay is loaded into containers, put on cargo ships in Los Angeles and sent across the ocean to Asia or the Middle East.

Al Dahra has been part of a wave of foreign-owned companies that have arrived in Arizona. The company Fondomonte, part of the Saudi dairy giant Almarai, also acquired the nearly 10,000-acre Vicksburg Ranch in 2014 for \$48 million and has been exporting vast quantities of hay for its cows in the Middle East.

The average well in McMullen Valley has fallen 184 feet from the average levels in the 1950s, one of the largest drops in the state. In the Ranegras Plain, where the Saudi dairy is located, the average drop was 120 feet. The Arizona Republic analyzed water-level measurements from the state's groundwater monitoring database, which only includes information from well owners who give permission.

Some individual wells plummeted: 20 wells that were monitored by the state in Salome and Wenden fell more than 200 feet since measuring began. One well, on property owned by IFC, fell 357 feet from 1967 to 2016. In 1967, the depth to water was 213 feet but in 2016 it had declined to 570 feet.

A well on the Fondomonte property in Vicksburg fell from 252 feet in 1982 to 393 feet in 2017. A second well near both the hay farm and the Hayes' property fell 175 feet from 1983 to 2016.

The average in all wells statewide has dropped 108 feet since the 1950s. There are no state or national standards that determine how big of a drop in a well is problematic. The only standard Arizona has for wells is a rule inside managed areas that a well cannot be built if it will drop a neighbor's well by more than 10 feet over five years.

Most of these declines can't be attributed to the corporate farms because they only arrived in the area five years ago. There aren't enough measurements in state databases to track the declines during the past five years.

IFC declined to comment. Al Dahra responded to questions with a statement that said the company uses state-of-the-art irrigation and water management on its farms, including drip irrigation and soil moisture probes. The company intends to remain in Arizona for the long term and is "actively engaged in state-level water policy and planning efforts in order to help Arizona deal with drought conditions in smart and sensible ways," the statement said.

Representatives from Fondomonte said the company has spent \$50 million modernizing equipment to save water and the company plans to stay in Arizona forever.

The company would only answer questions in writing and declined to say how much water Fondomonte uses annually, other than its water use is consistent with other farming operations across Arizona.

"They want to be in Arizona, home to some of the most productive farms in the world, forever and with that comes a water stewardship that they take seriously, continually refining their practices to be one of the most efficient farming operations possible," wrote Jordan Rose, an attorney who represents the company.

Starting in the late 1970s, John Weisser developed the farm in Vicksburg that Fondomonte later bought in 2014. He doesn't share other residents' concerns about the dropping water table, which he sees as an inevitable part of farming in the desert.

"It doesn't rain enough here for it to ever replenish," he said. "And it never will. As long as there's anybody living here, it will never quit dropping."

He isn't concerned about the Saudi Arabian farm, contending that someone else would be farming the area if Fondomonte wasn't.

Weisser is the man to call in the Salome and Vicksburg area if your pump breaks and you need to install a new one for your well. He checks wells regularly and said water levels aren't dropping as fast as they did in the past because farms are using water-saving technology.

He said water is available at deeper levels.

“There’s plenty of water,” he said. “You’ve just got to go deeper.”

But Saiter, the store owner in Wenden, said she’s alarmed by the changes that have swept over La Paz County in the past decade.

Her grandparents worked on farms in McMullen Valley decades ago, and she remembers that when she came to visit, she ate fresh melons from the fields. Now she runs the store, selling everything from colorful clothing to vintage vinyl records, and the farmlands have mostly been converted to alfalfa.

“They used to grow food for people. Now it’s more growing alfalfa for cows,” Saiter said. “Agriculture’s been around for decades, but it was done on a smaller scale. Corporate farming has taken over.”

Saiter is concerned that the water-intensive crops aren’t appropriate for the area, and that all the hay is being shipped off to feed cows elsewhere.

“The agriculture has expanded drastically,” she said. “It’s just more and more and more. There’s only so much that we can take.”

Calls for taxing the water

The situation has put residents of conservative La Paz County in a strange place: calling for government regulation and for new taxes.

Some homeowners in the county say the farms are getting a sweet deal. They profit from exporting crops as they draw down the water table. If these farms keep taking the water, the homeowners argue, they should at least be charged for it.

Wayne Wade is one advocate of taxing the farms. He lives near the Fondomonte farm and owns another property where he’s had trouble with the well.

When he bought the property in 2008, he paid about \$16,000 to have the 500-foot well drilled. That was “before the Arabs started drilling all their wells around here,” he said.

In June 2015, Wade’s well died. He learned the pump, which was about 440 feet underground, had burned up when the water level dropped.

He spent \$3,700 on a new pump and had it installed lower, at 497 feet, just three feet above the bottom of the well.

“I don’t know how long it’s going to last,” Wade said.

Wade worked as an industrial electrician in Wyoming, where companies pay a severance tax when they extract oil or gas. He said something similar should be done here, some kind of “water severance tax” for the companies that are drawing down the water supply.

He said the tax revenues could help compensate people whose wells fail, and also boost the county’s meager finances.

“I’m not for control, but if you had something like that, perhaps when a well goes dry, there would

be some funds there,” Wade said.

Gary Saiter, who heads the Wenden water district, agreed that farms should pay something, even if it’s just a slight fee, for the groundwater they use.

He said he isn’t against farming, which is a huge part of the area’s economy. But the farms affect others by drying up wells and causing the ground to sink, which has worsened flooding around Wenden.

“That fee could go to help people whose wells have dried up,” said Saiter, who is married to De Vona. “Why should water in the southwest of the United States be totally free?”

Larry Hancock owns LKH Farming and is one of the few local farmers who competes against the corporate farms. He is against any regulation of water in McMullen Valley because he said people don’t realize all the new rules that will be created until it’s too late.

“We’re not basically regulated. You don’t want to be regulated,” Hancock said. “It’s been like this forever and let’s keep it this way. Maybe I’m old-fashioned but we police our own selves here.”

While he has farmed all over the state, the base of his operations is around Salome, where he farms about 5,000 acres of various crops, like wheat, alfalfa and watermelons. Hancock said he also farms in Pinal County — a part of the state where groundwater pumping is regulated — and costs are higher there.

He said farmers want to conserve water and all of his farms, along with others in McMullen Valley, are on drip irrigation, which significantly reduces water usage. He said his livelihood depends on there being enough water.

Hancock said he sells his first crops to local dairies and then to retail markets in Phoenix or Wick-enburg, but he also exports crops as well.

“They say that we’re exporting water,” Hancock said. “If that’s what they want to call it, that’s fine. We’ve been doing that for years and it’s going to continue.”

Brown fields, green fields

Salome High School’s brown sports fields couldn’t contrast more with the surrounding area. Just across Salome Road, there are bright green fields of silage corn as far as the eye can see.

Bill Farr, the owner of Salome Water Company, cites the fact that he hasn’t raised rates for 38 years as the reason the system doesn’t have enough pressure for the school district to water its fields. He won an emergency rate increase from the Arizona Corporation Commission in 2016, but said he will file for another increase soon.

“I’m kind of short of money to say the least,” Farr said. “We’ve never been this short of water before, and I’m doing what I can with two wells. They’ve both been running for over 90 days 24 hours a day. So I am making all the water I can make with what I have to make it with.”

Farr insists that the rate increase will pay for better infrastructure, like pumps and water tanks, which will increase the amount of water so the schools can water the grass. But he also conceded that Salome Water Company will have to drill a new well in the near future.

“I hate telling them not to use water,” he said.

As the water is pumped out, the ground has been sinking in McMullen Valley. State surveying shows that the land north of Wenden has sunk by more than 3 feet since 1991, and that this subsidence has been accelerating.

The latest satellite measurements mapped by the Arizona Department of Water Resources show that parts of the valley sank by 2-4 inches during a yearlong period from March 2018 to April 2019. The subsiding land has changed the contours of the floodplain along Centennial Wash, worsening flooding in Wenden.

Irwin, the La Paz supervisor, said as things stand now, La Paz County is in a water crisis and the situation will continue to worsen until action is taken.

“It’s just like a free-for-all,” Irwin said. “Anybody can come in and buy up land, and they can punch as many holes in the ground as they want to pump out water.”

Irwin said some residents have gotten so angry, they’ve threatened to take matters into their own hands.

“I’ve had people tell me, ‘We just want to throw bombs down their wells.’ It’s gotten that serious,” she said.

Irwin said she feels frustrated that the concerns of the county’s people haven’t yet sparked concrete changes.

“It is an emergency,” Irwin said. “We’re hoping that the state can step in and help us.”

*Environmental coverage on azcentral.com and in *The Arizona Republic* is supported by a grant from the Nina Mason Pulliam Charitable Trust. Follow *The Republic* environmental reporting team at environment.azcentral.com and @azcenvironment on Facebook, Twitter and Instagram.*



ARIZONA'S NEXT WATER CRISIS

These 7 industrial farm operations are draining Arizona's aquifers, and no one knows exactly how much they're taking

By Rob O'Dell and Ian James, Arizona Republic

<https://www.azcentral.com/in-depth/news/local/arizona-environment/2019/12/05/biggest-water-users-arizona-farms-keep-drilling-deeper/3937582002/>

The last time Regina Cobb traveled east of the Kingman airport toward the Peacock Mountains, the area was mostly unspoiled desert where cattle grazed on the sparse Mojave Desert vegetation.

She had driven up the dusty rural road to store a bighorn sheep she killed on a hunt.

Returning to the area 10 months later, she was shocked that the high desert landscape of creosote and cholla was now a 850-acre pistachio farm where more than 125,000 saplings had been planted.

Along each row of waist-high saplings, long black irrigation tubes stretched out to connect the seemingly endless trees and nourish them with water.

“If you look straight down these rows it goes back as far as the eye can see,” Cobb said. “It boggles the mind how many trees are out here.”

Peacock Nuts, a consortium that includes the largest permanent crop nursery in the United States, has even bigger plans: 4,500 acres and as many as 650,000 pistachio trees.

“There’s no way we have enough water to be able to handle that,” Cobb said.

In Kingman, as in most of rural Arizona, there are no rules on groundwater pumping. As long as you get a permit, you can drill a well of any size for any purpose as long as it’s for a beneficial use. Agriculture easily qualifies, even if the crops are shipped out of state for profit.

Peacock Nuts is one of seven corporate farms identified by The Arizona Republic as major agricultural groundwater users in Arizona. They include private-equity firms, investment funds focused on agriculture, and foreign food companies, mirroring the nationwide trend of big capital driving the ag industry and leading to larger farms.

There’s no cost for the groundwater other than the cost of drilling the well and the electricity to bring the water to the surface. That’s brought companies from California, Las Vegas, Minnesota, Saudi Arabia and the United Arab Emirates to rural areas throughout the state seeking to exploit Arizona’s underground resource.

Companies use Arizona’s groundwater to grow alfalfa, pistachios, pecans or other crops and then export some of the products to other states or countries.

Cobb, a Republican representative from Kingman, said the Peacock Nuts operation is “mining our water.” She said this is why she is “obsessed” with doing something about out-of-state agribusiness using up Arizona’s precious resources to profit.

“The term I heard a lot of years ago was virtual water,” said Marvin Glotfelty, a groundwater expert and consultant. “It’s not legal to export groundwater or surface water out of the state. That’s by law. But you can export virtual water.”

Farms from Saudi Arabia and the United Arab Emirates doing just that have angered residents in the La Paz County communities of Vicksburg, Salome and Wenden.

“You can do that with what you generate as a product of the water,” Glotfelty said. “We don’t have the rules in place to prevent that from happening.”

Cobb wants to change that and have the state approve an emergency “irrigation non expansion” area for Kingman to limit any new agricultural wells from being drilled. It would be the fourth INA created under the state’s groundwater management act.

The state Department of Water Resources has already rejected this, effectively saying pumping hasn’t drained enough water out of the aquifer to meet the standards to create a new INA.

Bruce Babbitt, the former Arizona governor who signed the landmark groundwater management act in 1980, called the state’s letter to Mohave County rejecting the INA “numbo jumbo.”

“The bottom line was just, sorry, we don’t have jurisdiction to help you,” Babbitt said.

Tom Buschatzke, director of the state’s Department of Water Resources, said the law prevents him from acting. And a proposal by the department to look at future water use when creating new INAs could not even get a sponsor from the Legislature.

“I can only look at the current rates of use,” Buschatzke said. “I can’t look out into the future. That’s what the law says. And so I don’t have the ability to project out what might happen 50, 100 years from now.”

Cobb said she wants the Legislature to create new rural management districts, which could enact new regulations to limit well drilling and groundwater extraction, tailored for the unique characteristics of each rural area.

Cobb has been trying to pass water legislation for five years. All she has managed to get is a study of groundwater conditions in Mohave and La Paz counties.

As elected officials fail to act, large farms continue to flee regulation elsewhere and find land and free groundwater in rural Arizona.

“You almost feel helpless because we can’t get anything passed legislatively,” Cobb said, because legislators are scared regulation in one area will spread to other areas.

The Arizona Republic identified major agricultural water users through interviews with residents, growers and public officials across the state, through property records and well data. By analyzing more than 250,000 well-drilling records, more than 30,000 well-depth records and property records in 10 Arizona counties, The Republic compiled a list of large out-of-state companies that could be — or have been — some of the largest water takers in the state.

They are just projections. It is impossible to know how much water large farms are taking. The state doesn’t require meters on wells in rural Arizona, so nobody is tracking how many gallons are pumped out. Well monitoring data is limited by voluntary participation and infrequent readings. And the large corporate farms are all new arrivals, coming to Arizona since 2012.

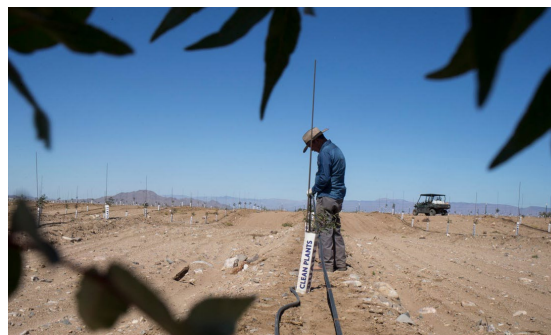
But well drilling records show these farms own more than 700 wells and collectively have drilled more than 200 wells deeper than 1,000 feet, allowing them to draw down aquifers more quickly and dry up shallower wells.

Combined, the seven companies own, farm or control more than 130,000 acres across the state. Though not all of that land is irrigated, if it were, it would equal nearly 15 percent of the harvested cropland in Arizona, as tallied by the U.S. Department of Agriculture.

Some grow nuts. Some grow hay. Some can draw water from nearly half a mile below ground. All have at least one thing in common: They take as much water as they want, with no limits.

The newcomers: Peacock Nuts

Peacock Nuts LLC is a huge consortium of interests that includes Duarte Farms, which calls itself the largest permanent crops nursery in the United States, a farmer from Las Vegas and several U.S. investors who live abroad.



Eusebio Rivera works on an irrigation line in a field of young pistachio trees at Peacock Nuts Co.’s farm. MARK HENLE/THE REPUBLIC

The operation was set up quickly. After coming together in December 2018, the group bought nearly 7,500 acres east of the Kingman Airport. The pistachio trees will eventually extend to the base of the Peacock Mountains.

Kathleen Tackett-Hicks, spokeswoman for the group, said Peacock Nuts plans to farm a maximum of 4,500 acres. Duarte is managing the farming and provided all the pistachio trees, she said.

She said concerns about water use are overblown because the property had already been approved by Mohave County for a housing project and was given a 100-year assured water supply of 13,000 acre-feet annually by the state.

“We were taking an already approved project that had failed and we’re using the water for ag purposes now,” Tackett-Hicks said. “We’re using what was already allocated.”

Peacock was more open than other farms in sharing information. Its representative took Republic reporters and photographers on tours of the property and provided information about the farm’s water use for a legislative study on the Mohave County basins.

Tackett-Hicks touted the water-saving technology on the property, including double drip line irrigation with emitter clips to save water, along with moisture sensors throughout the property to determine the best times to water.

Peacock Nuts also didn’t bulldoze a natural wash on the property, instead electing to allow it to flow through the property and serve as a wildlife corridor, which Tackett-Hicks called unique for an agriculture project.

“From the get-go they wanted to do things right,” Tackett-Hicks said.

Kingman Mayor Jen Miles said orchard crops like pistachios also use much less water than alfalfa, which was planted on other farms north of Kingman.

Miles said she appreciated that Peacock is trying to use conservation measures like drip irrigation, but she said she’s still concerned that the expansion of agriculture in Kingman could deplete water the town relies on.

“It’s still water extraction for farming,” she said. “We must look at ways to make sure the expansion of agriculture is not going to be so fast it just depletes our aquifers.”

The giant dairy: Riverview near Willcox

Peacock Nuts

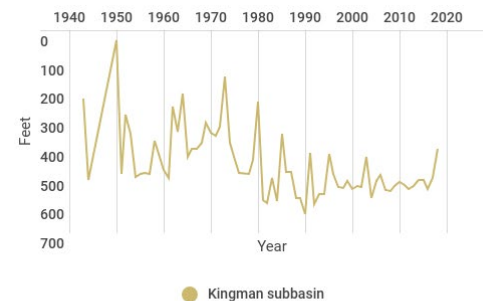
ACRES: 7,500 (4,500 planted) ARRIVAL: December 2018

WELLS DEEPER THAN 1,000 FEET: 5 of 10

Deepest well: 1,490 feet



Average water level in wells



SOURCES: Department of Water Resources, county assessor, Google Earth

With more than 37,000 acres in the Willcox area, Riverview LLP, a Minnesota dairy, may be the largest corporate farmer in the state and the farm with the most wells.

Started in 2014 with the purchase of the Faria Dairy on Kansas Settlement Road south of Willcox, it is building a huge expansion to the southeast called Turkey Creek Dairy.

Together the company plans to manage 150,000 cattle on both properties, said spokesman Kevin Wulf.

The new Turkey Creek farm has 14,000 “calf-huts” that look like large dog houses and are used to house calves that are immediately taken from their mothers after birth. The huts are arranged in rows that are longer than football fields.

Riverview produces the majority of the food for its cattle on its properties, growing wheat, silage corn and alfalfa. Records show the company has 420 wells. More than 90 of these wells are drilled to depths of more than 1,000 feet. Its deepest well is nearly 2,500 feet deep.

The round circles of bright green crops created by Riverview’s 200 center-pivot irrigation systems fall away from the road as Kansas Settlement slices north and south through the area. These emerald green circles can easily be seen from above or in satellite images.

Wulf declined to say how much water is used annually. He said the company has reduced water usage by 25 percent since it purchased the land.

Wulf said the dairy would like to be a part of the water solution in Willcox and is supportive of water regulation in Arizona, though he couldn’t say the exact rules he wants enacted.

“It has been pretty much a free-for-all,” Wulf said. “There could be some things to be gained by having water regulated across the state.”

Peggy Judd, a Cochise County supervisor, is a huge proponent of farming in the Willcox area, particularly the Riverview dairy. She said the companies didn’t invest millions of dollars into the area “in order to fail.”

“They don’t intend to ever leave,” Judd said. “They know there’s enough water.”

But the water pumped by commercial farms has helped dry up wells owned by residents, who worry for their future. Riverview offered to contribute money toward a new water system being proposed for the residents close to its farm, Wulf said. But that won’t stop the pumping of the aquifer.

Riverview

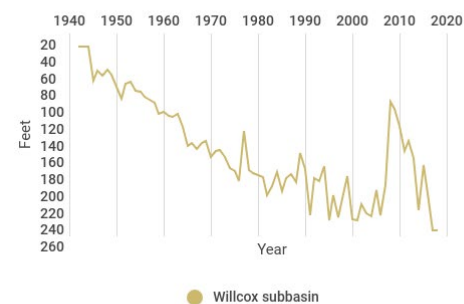
ACRES: 37,000 in Willcox area ARRIVAL: December 2014

WELLS DEEPER THAN 1,000 FEET: 95 of 420

Deepest well: 2,500 feet



Average water level in wells



SOURCES: Department of Water Resources, county assessor, Google Earth



Workers install calf huts in August at the new Turkey Creek Dairy near Willcox.
MARK HENLE/THE REPUBLIC

“This is a major, major deal for this county,” said Claire Miller, who lives near several farms. With tens of thousands of cattle and the company insisting on growing all of the food on its land, “you are talking a lot of water,” she said.

As a former business owner, Miller said she can see both sides of the issue. But she said she is scared by the sheer amount of water being pumped out.

“If the damn state, pardon my French, and the county do not stop handing out commercial well permits like your Christmas candy, us homeowners are going to be screwed,” she said. “I told my husband I want to move. I want to sell, that’s it.”

The Saudi hay farmers: Fondomonte

Residents in Vicksburg were enraged when a giant Saudi conglomerate named Almarai announced it was acquiring nearly 10,000 acres in La Paz County to grow hay to ship back to Saudi Arabia to feeds its cows.

A release by the Arab News added the kicker: “This transaction forms part of Almarai’s continuous effort to supply the highest quality alfalfa hay from outside the Kingdom to support its dairy business. It is also in line with the Saudi government direction toward conserving local resources.”

La Paz County residents read that as: They want to conserve their resources by using ours.

Almarai’s subsidiary, Fondomonte, owns much of the land east of Vicksburg Road to the mountains separating Vicksburg from Salome. Large open-sided metal structures house thousands of stacks of hay and there are more structures than one can count. Access to the farm is strictly limited, with visitors required to go through security.

Fondomonte would only respond to questions in writing, but its representative, Jordan Rose, said the company owns 3,600 acres in Vicksburg and leases another 6,200. The company also

leases property in Butler Valley, she said.

Rose said the company has spent \$152 million in Arizona and employs 178 people. The company is the fifth largest employer in La Paz County, Rose said, and 102 of its employees live in company housing.

Fondomonte has spent \$50 million to upgrade the irrigation infrastructure and technology to significantly reduce the water usage on the farm, Rose said, adding the company wants to be in Arizona forever and be “one of the most efficient farming operations possible.”

The company declined to disclose how much water it uses annually, saying use is consistent with other farming operations.

Nearby residents are calling for the state to stop issuing well permits because their wells are going dry.

“Fondomonte being a foreign company that is here taking our water, that doesn’t rub well ... with the residents that are out here,” said Holly Irwin, the La Paz County supervisor who represents the area. “They look at it as, you know, how come we’re not doing anything here to prevent the foreign companies that are coming in here and utilizing our water shipping their products back to foreign countries.”

Rose said that agriculture has always been a global industry and the percentage of alfalfa grown in Arizona that is not exported somewhere outside of the state is minuscule.

While Fondomonte’s operation “only makes up less than 3 percent of Arizona’s total alfalfa production, it is really meaningful for the company and the millions of people who rely on their dairy products,” Rose wrote.

The middlemen: IFC and Integrated Ag

Deepest well: IFC 1,610; Integrated Ag, 1,805.

It’s not only the corporate farms that are profiting from Arizona’s underground water. The rush to drill has also brought in investment firms that prepare the land for farming, drill wells and either rent out the land or sell it.

Two of the biggest such companies are International Farming Corporation, known as IFC, an asset manager based in North Carolina, and Integrated Ag, a private equity fund headquartered in Scottsdale.

Larry Hancock, the owner of LKH Farming, rents about 2,500 acres of farmland in the Wenden area from IFC. He said much of the money to develop Arizona farmland is coming from East

Fondomonte

ACRES: 10,000

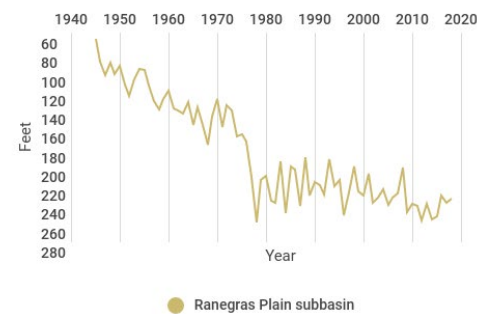
ARRIVAL: March 2014

WELLS DEEPER THAN 1,000 FEET: 12 of 28

Deepest well: 1,210 feet



Average water level in wells



SOURCES: Department of Water Resources, county assessor, Google Earth

Coast investment funds interested in purchasing farmland for the money it will bring in, especially given low interest rates.

“These funds are buying up farm ground,” Hancock said, adding that farm real estate is seen as a good investment.

He said the companies buy the farms with investors’ money and rent it out, with the hope of keeping 5% for the company and returning about 5% to investors. If the property value appreciates, both parties can make even more, he said.

IFC came into La Paz County in 2012 when it outbid several other firms to buy nearly 13,000 acres from the city of Phoenix for \$30 million during the last economic downturn. After the sale, the amount of irrigated farmland in Wenden and Salome expanded.

IFC announced last year that it was seeking to raise \$1.5 billion in capital to buy large farm properties and lease them out to tenants. In February, the firm said in an SEC filing that it had raised \$404 million so far. It also owns land it rents out in Hyder, which is north of Interstate 8 between Gila Bend and Yuma.

IFC declined to comment, citing a policy of not disclosing non-public information.

Integrated Ag was created in 2012 and is headquartered in Scottsdale. In 2015, Agri Investor reported that the company had a pipeline of about \$200 million of investments and was planning to create a new \$250 million fund to invest in distressed real estate in Arizona and Nevada.

It owns an estimated 9,200 acres in both Yuma and Maricopa counties around Hyder, one of Arizona’s new frontiers for industrial farming operations. The company also owns land in Pinal County. The company has at least 81 wells, and 34 of those are deeper than 1,000 feet.

Michael Timony, a partner in Integrated Ag, said the company has invested \$90 million in farmland and irrigation improvements in Arizona. The company turns inefficient flood-irrigated farmland into highly productive farmland with highly efficient irrigation systems that use 20 percent to 50 percent less water, he said.

He said drip irrigation is also good for organic farming and the company tries to keep its farming organic whenever possible.

“The Hyder area can support row crops, produce and permanent crops,” he said. “We chose this area because of its great growing conditions and abundant sustainable water.”

Mark Skousen, who runs a second-generation family farm in Hyder, is concerned about the surge of well-drilling since Integrated Ag and IFC arrived in the valley.

International Farming Corp.

ACRES: 15,500

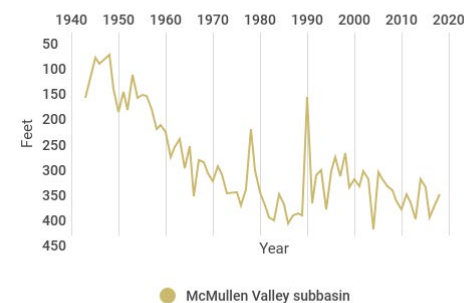
ARRIVAL: 2012

WELLS DEEPER THAN 1,000 FEET: 25 of 65

Deepest well: 1,610 feet



Average water level in wells



SOURCES: Department of Water Resources, county assessor, Google Earth



A tractor on a newly planted garlic field at LKH Farming's farm in Salome. MARK HENLE/THE REPUBLIC

Skousen estimated more than 30 wells have been drilled recently, adding, “nothing is protecting our water.”

“I think if they turned all those 30 wells on, our water table would drop, and our water would be expensive, and we would have less water. And we could farm less,” he said. “If they pump them all, it’s whoever has the biggest straw is going to get the last drop, I guess.”

His wife, Trixie Skousen, said she fully expects their corporate neighbors will squeeze what they can out of their investments and then leave once there is no more money to be made. She said the farms don’t care about Arizona or the Hyder community.

Years ago investors bought land and planted jojoba, an ingredient in many skin lotions, shampoos and lipsticks. They struggled to make money and eventually left. Then the big date farms came in and then also left. Now she sees some of the alfalfa farms struggling.

“They come in with a big idea and sell to their investors, the investors put money in it, then they lose everything and they move on,” she said. “In the 40 years we’ve been out here there’s been a cycle of that.”

In three hotspots: Al Dahra ACX

Al Dahra ACX is part of Al Dahra Holding, which is based in the United Arab Emirates, and the company says it is “the No. 1 forage exporter in the United States.”

It produces alfalfa, Sudan grass, and other types of hay on about 30,000 acres in the U.S., including farmlands in Arizona as well as California’s Palo Verde and Imperial valleys. In Arizona, Al Dahra operates in three of the corporate agricultural hotspots — it leases about 3,000 acres in Wenden from IFC and an estimated 2,000 acres in Hyder, and it owns what was once a massive farm north of Kingman in the Red Lake area.

Through a company called Red Lake Ventures, the company owns 16,000 acres, though it is now

farming only a fraction of that. Once, it farmed thousands of acres of alfalfa and other crops by using towering center-pivot irrigation systems that created circular green islands in the brown desert on the way out to Red Lake.

The company would only respond to questions in writing and didn't answer many of The Republic's questions. But Al Dahra said its Hualapai Valley Farm no longer grows alfalfa.

"New crops that are less water-intensive and higher value such as hemp and baby potatoes are being produced," the company said in an emailed statement. Al Dahra said some of its crops are sold in the United States and others are exported.

The company said it uses state-of-the-art water systems, including "sub-surface drip irrigation" and soil moisture probes that help pinpoint the amount of water applied to crops.

Al Dahra said it has about 170 employees in Arizona. The company did not answer other detailed questions about its wells and how much water it uses.

"Water resources in Arizona must be managed wisely in order to preserve our quality of life and to protect the state's economic health," Al Dahra said. "The company is fully committed to Arizona and plans to remain here for the long-term."

On its website, the company says it "continues to invest in growing its farming lands portfolio."

Al Dahra sells hay in the U.S. and exports to countries across Asia and the Middle East. It owns and leases enough land to cultivate as much as 44,000 tons of hay per year. The company also runs three hay pressing facilities in Arizona, California and Washington.

Mary Goodman lives to the southwest of Al Dahra's fields in Wenden that are rented from IFC.

She said fields have appeared in the desert to the east and north of their home during the past three or four years. She's seen new industrial wells appear off of Highway 60, along with two large irrigation ponds, which they've heard can hold 25 million gallons each.



A sign stands outside Al Dahra's McMullen Valley Ranch in Wenden. MARK HENLE/THE REPUBLIC

Al Dahra ACX

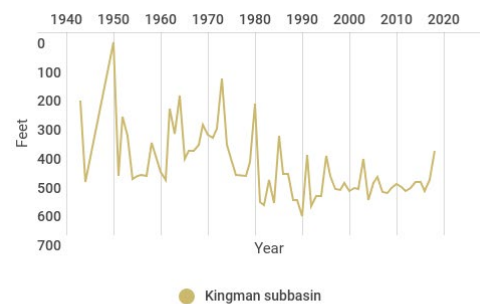
ACRES: 16,000 in Kingman area ARRIVAL: 2013

WELLS DEEPER THAN 1,000 FEET: 33 of 88

Deepest well: 1,203 feet



Average water level in wells



SOURCES: Department of Water Resources, county assessor, Google Earth

She already had to replace one well on her property. One well is about to give out, and she's not sure how long their remaining well will last.

"There's no protection for this valley for water," Goodman said. "Anybody can come out here and literally rape the valley of its water. So it's just scary. You think you're set here for life. This was our dream retirement home, and all of a sudden, it's more of a nightmare."

Ghost pivots: Kingman Farms

Driving Stockton Hill Road north out of Kingman, the road drops down to the desert floor. On the way out to the dry Red Lake, where the dirt is so red it once stood in for the surface of Mars in a Hollywood movie, there is a peculiar sight.

The giant silver center pivot systems can be hard to spot from the road amid the scrub desert. Look hard and you can see the pivots marooned in the desert like a shipwreck.

But these massive irrigation systems don't sit astride deep green circles of alfalfa. Instead these ghost pivots sit on weeds and land that the desert has reclaimed. The pivots look as out of place as the green alfalfa once did next to the red dirt from the dry saline lake.

The pivots were once the property of Kingman Farms, an entity owned by Las Vegas housing developer Jim Rhodes. His arrival in 2012 triggered Mohave County's concerns about its dwindling groundwater. Before the farms came in, Mohave County had virtually no large-scale agriculture.

Rhodes, who once hoped to build tens of thousands of new homes in parts of Mohave County, began blading desert, drilling wells and installing center pivots to farm hay and other crops for export. At the peak, Rhodes owned about 34,000 acres and had shocked the community into creating plans to try to conserve its water.

Rhodes declined to comment when reached by phone.

Groundwater studies by state and federal scientists have shown a dramatic increase in pumping since the agricultural businesses arrived. That pumping draws on groundwater that has built up over thousands of years. As it's pumped out, the scant rain that falls on the desert isn't enough to recoup the losses.

A federal study showed that in 2011 groundwater pumping in the Hualapai Basin surrounding Kingman exceeded the rate of recharge by 5,600 acre-feet annually. A state study found that in 2016, that deficit had increased to 37,600 acre-feet — enough water to supply about 113,000 average single-family households in Phoenix for a year.

Kingman Farms

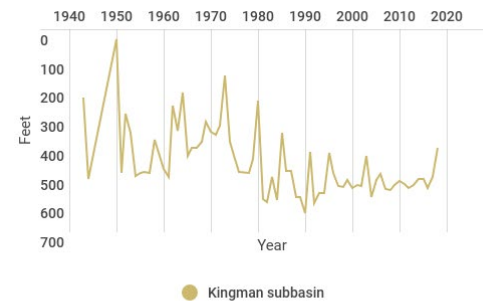
ACRES: 34,000 in Kingman area ARRIVAL: 2012

WELLS DEEPER THAN 1,000 FEET: 2 of 35

Deepest well: 1,335 feet



Average water level in wells



SOURCES: Department of Water Resources, county assessor, Google Earth



The pivots were once the property of Kingman Farms. MICHAEL CHOW AND THOMAS HAWTHORNE/
THE REPUBLIC

Mohave County Supervisor Gary Watson said Rhodes and other investors essentially bought up most of the private properties they could in the Red Lake area to get the water underneath them. “It hit just all of sudden, just like less than a year,” Watson said. “The farms started leveling all the land, and it was very alarming to a huge number of us who were really appalled at the size of these projects.”

Hay prices were high when Rhodes started his project but five years later the prices had dropped. The farms scaled back operations because of the expense of getting the water out, Watson said. With no power lines to the area, the company had to use diesel generators.

“They really couldn’t make any money growing alfalfa,” he said.

Several companies behind the project went bankrupt and the pivots were left in the desert to rust. But the groundwater the company pumped out is gone and won’t be coming back. And the wells drilled could always be used by the next owner.

“The threat is constantly going to be there,” Watson said.

Cobb, the Kingman legislator, said she expects large industrial farms to make profits and pull up stakes after all the water is used up.

“These aren’t local farmers. These are farmers from outside our area coming in and utilizing our resources,” Cobb said. “They are just going to suck it dry and then be gone.”

*Environmental coverage on azcentral.com and in *The Arizona Republic* is supported by a grant from the *Nina Mason Pulliam Charitable Trust*. Follow *The Republic* environmental reporting team at environment.azcentral.com and [@azcenvironment](https://www.facebook.com/azcenvironment) on Facebook, Twitter and Instagram.*



Vermilion flycatchers are among the San Pedro River's more than 350 bird species.
MARK HENLE/THE REPUBLIC

ARIZONA'S NEXT WATER CRISIS

It's one of Arizona's most precious rivers. Hundreds of new wells may leave it running dry

By Ian James and Rob O'Dell, Arizona Republic

<https://www.azcentral.com/in-depth/news/local/arizona-environment/2019/12/05/water-pumping-threatens-arizona-riparian-area-san-pedro-river/3937598002/>

A flash of red streaked through the trees: a vermilion flycatcher. The brightly colored bird chirped and trilled, adding to a chorus that rang from the towering trees.

Beneath the shady canopy of cottonwoods and willows, the San Pedro River flowed shin-deep, gurgling through smooth rocks.

This green artery, which snakes north from the Mexican border into southeastern Arizona, nourishes an astoundingly rich variety of life, including more than 350 species of birds, many of which stop here during migration. The forests and wetlands along the river teem with animals from frogs to bobcats to butterflies.

The ecosystem depends on the river, and the river itself depends on an unseen source. Much of its flow is fed by groundwater, emerging from the aquifer in springs and seeps, sustaining the river.

Over decades, as more wells have been drilled across the river valley, pumping has lowered the water table in many areas, drawing away water that would otherwise replenish the river's underground sources.

For the past 24 years, activist Tricia Gerrodette has immersed herself in court cases, written letters and spoken at government meetings to advocate for protecting the river. She said this oasis is fragile and could rapidly be destroyed if groundwater levels continue to decline.

"In a dry place, water is life," Gerrodette said, looking out over a pond beside the river in the San Pedro Riparian National Conservation Area. Though the aquifer still feeds the river here, she said, "it's at risk because we continue to pump from that aquifer and drop the level."



Tricia Gerrodette says she fears groundwater pumping could destroy the San Pedro River. She hopes for changes that keep the river flowing, but says: "I'm terrified for its future." MARK HENLE/THE REPUBLIC

Decades ago, water diversions and heavy groundwater pumping dried up other rivers across Arizona, from the Santa Cruz in Tucson to long stretches of the Salt and the Gila around Phoenix, leaving parched riverbeds.

The San Pedro has survived as one of the last free-flowing rivers in the Southwest. But many segments of it have suffered long-term declines as pumping has pulled down groundwater levels. Some stretches that once flowed year-round have been transformed into dry sand, running aboveground only when rainstorms bring bursts of runoff.

The river's connection to groundwater is visible in the way it flows, running aboveground for one segment, dropping underground through a dry stretch, and reemerging farther downstream, where the aquifer's levels or different geology push the water out of the ground again.

But the connection between surface water and groundwater isn't recognized in the law. In Arizona, as in other western states, different rules apply to surface water and groundwater. While diversions from streams and rivers require a water right based on historical use, state law allows unlimited groundwater pumping in unregulated parts of the state, including the San Pedro River Valley.

The law doesn't require anyone to consider rivers when they're drilling new wells. The only legal requirement is that the groundwater be put to "reasonable use." As more wells have been drilled to supply growing towns along the river, the lack of restrictions on pumping has left the San Pedro closer to drying up.

An analysis by The Arizona Republic shows significant and widespread declines in groundwater levels near the river. Average water levels in wells monitored by the state in the river's watershed dropped from 47 feet in the early 1950s to 208 feet during the past four years.

The number of wells drilled in the watershed has increased. In the Sierra Vista subbasin of the upper San Pedro, where the most development along the river has occurred, 871 wells have been drilled from 2015 to late 2019. That is on track to be the highest five-year period since the data collecting began in the early 1970s.

The same is true for the Mammoth subbasin to the north, in the lower San Pedro.

And the wells are being drilled to much deeper levels. The average depth of new wells drilled since 2010 in the Sierra Vista subbasin is about 150 feet deeper than wells drilled in the 1970s. Gerrodette described what she sees as a worst-case scenario: If the aquifer falls too much, she said, the river would dry up and eventually trees would wither when their roots could no longer reach the water table. Over a period of years, the green corridor would wither, and the birds and animals would vanish.

Gerrodette said the river is now “hanging on by a thread” — threatened not only by pumping that occurs today, but also by pumping that happened decades ago. Over the years, wells in the Sierra Vista area pulled down the aquifer and left what hydrologists call a “cone of depression,” a drawn-down portion of the water table that continues to expand toward the river.

Despite conservation efforts, communities near the river still use more groundwater than they did in the mid-1990s, Gerrodette said, and now developers plan to build thousands of new homes, all of which would rely on the same groundwater that supplies the river.

“That’s my greatest fear, is that the river will be overcome,” Gerrodette said, “and that we would lose this treasure.”

Still an oasis, but changed by pumping

Humans have lived along the San Pedro River since prehistoric times. Archaeologists have found bones of bison and mammoths at sites where they say Clovis people hunted and killed the animals about 11,000 years ago, after the end of the last Ice Age.

Over the centuries, other groups of indigenous people made their homes near the river, leaving rocks adorned with petroglyphs.



Richard Armstrong walks beside the San Pedro River, which forms a lush oasis filled with birds. MARK HENLE/THE REPUBLIC

When fur trappers rode through in the early 1800s, the beavers were so plentiful that they called it the Beaver River, a name that faded as the beavers vanished.

In the early 1900s, wells were drilled along the river, and they proliferated over the years to supply farms, the Fort Huachuca Army base, Sierra Vista and other communities.

In a 1970 article in *Arizona Highways*, Eulalia “Sister” Bourne wrote about her observations of the San Pedro starting in the ‘30s, saying it was “really rich in water” and had long hindered travel, leaving wagons and cars stranded in its waters.

Decades of pumping have weakened the river’s flows. The portions of the San Pedro that flow year-round have shrunk. In some places where only a thin ribbon of water remains, you can step across and barely get your shoes wet.

This change has occurred as the number of wells has skyrocketed in the upper San Pedro River basin to supply a growing population, more than doubling from 3,592 wells in 1987 to 8,765 wells in 2017, according to state data.

It only takes a small decline in groundwater levels to affect the surface flow.

The ecosystems along streams harbor all sorts of creatures, from salamanders to bats, and their gradual desiccation is helping push species toward extinction at an accelerating rate.

Across the United States, scientists have documented major declines in bird populations over the past 50 years, and they point to habitat loss as a primary cause. Wetlands have been drained and creeks have been sucked dry. The Colorado River delta in Mexico, which a century ago was filled with lagoons and wildlife, has been transformed into a dusty expanse of desert, while the water has been siphoned off to farmlands and cities.

The heating of the planet, unleashed by the burning of fossil fuels, is contributing to the stresses on species that are already struggling to survive. In the desert Southwest, research has shown that hotter temperatures are intensifying years of drought and shrinking the flow of streams.

With so many streams in decline, the San Pedro stands out as sanctuary for biodiversity. Stretching 140 miles from its headwaters in Mexico to its end in Winkelman, where it joins the Gila River, the river forms a green pathway through arid grasslands, a lush corridor that resembles a tropical forest and bustles with life.

Clumps of Huachuca water umbel, an endangered plant with slender leaves, grow in wetlands by the river — one of more than 600 species of plants found along the San Pedro.

Millions of migrating birds stop to feed during their journeys from Central America and Mexico to the rest of North America.

The American Bird Conservancy has named the San Pedro a “globally important bird area.” Birders come from across the country with their binoculars and scopes to search for rare species such as southwestern willow flycatchers and yellow-billed cuckoos.

An expanding ‘cone of depression’

Researchers with the U.S. Geological Survey have studied the hydrology, water-use trends, and groundwater levels in the river’s upper basin. They found some improvements in the watershed between 2002 and 2012, including the retirement of wells that previously irrigated farmland, and

the use of treated effluent from Sierra Vista's wastewater plant to replenish groundwater near the river.

But they pointed out even with these positive steps, "groundwater levels across much of the subwatershed are declining" because of the current pumping for the more than 80,000 residents and the effects of pumping years ago.

The "cone of depression" between Sierra Vista and Fort Huachuca has continued to deepen, they wrote in their report, and stream gauges at Palominas, Charleston and Tombstone show the river's base flow has decreased.

Stabilizing the amount of groundwater that's discharging into the river would be challenging, the researchers concluded, and if achieved would represent a "major groundwater-management success."

"If pumping across the subwatershed were to completely stop tomorrow," the scientists wrote, "the cone of depression would continue to spread and its effects, including decreases in natural discharge to the riparian area and river, would continue for decades."

The cumulative effects of pumping decades ago are still playing out underground. Even if pumping were to stop, the drawdown would continue to spread.

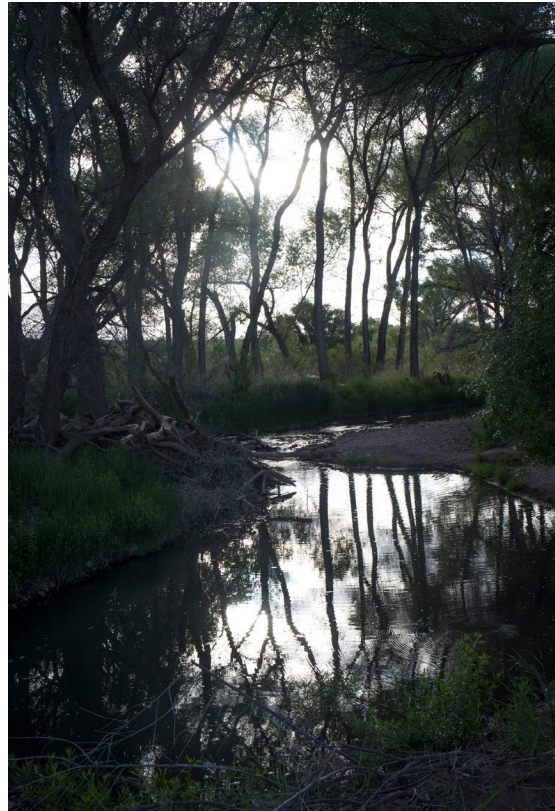
Thomas Meixner, a University of Arizona hydrology professor, said the expanding depression in the aquifer beneath Sierra Vista will eventually reach the river and consume the groundwater that sustains it — unless increases in recharge or decreases in pumping make a significant dent. "This groundwater cone of depression has grown for the last 70 years, and it has to be filled in somehow," Meixner said. "That debt ultimately has to be paid back, or it will eventually have impacts on the surface water system."

Meixner said conservation efforts by Fort Huachuca, such as letting grass dry up, have helped cut water use. He said these types of water-saving efforts must continue, along with initiatives to recharge the aquifer with treated wastewater or stormwater.

Other academic experts suggest that regulating how much water is extracted from the ground would make sense to protect the San Pedro.

"The river, as I see it, is on life support right now," said Juliet Stromberg, a plant ecologist and botanist. "We need to do everything we can to make sure water is still flowing into that aquifer to support the river and its ecosystem."

The rate of groundwater pumping isn't sustainable, Stromberg said, and if the watershed isn't managed more carefully, more of the river will vanish.



The San Pedro River is one of the last free-flowing rivers in the Southwest. MARK HENLE/THE REPUBLIC

River not protected in state law

At a basic level, the San Pedro River faces a legal problem: Even though groundwater and surface water are intertwined, they fall under different rules. And because the San Pedro isn't part of a state-established "active-management area," well owners can pump without restrictions.

This system has allowed for unchecked pumping to dry up rivers in many parts of the state, from the Rillito in Tucson to the Gila River in Maricopa, said Robert Glennon, a law professor and water expert at the University of Arizona. He called it Arizona's "crazy, bifurcated system."

State law also recognizes a category of water called "subflow," which is treated as surface water and requires a permit to use. In practice, though, thousands of individual household wells have been drilled in this "subflow" zone, Glennon said, and are taking a toll on nearby streams, including the San Pedro.

"Riparian areas are so special, and we've lost so many of them," Glennon said. "We need to protect every one that's left."

State water regulators have continued granting permits for wells to be drilled and have cleared the way for thousands of new homes near the river by issuing certificates stating there is an adequate water supply.

Plans for two giant developments have sparked lawsuits. One case ended last year at the Arizona Supreme Court, with a majority of justices backing a determination by state water regulators for a Sierra Vista development with nearly 7,000 homes.

In another case, environmental groups sued the Trump administration over its granting of a permit for a proposed development in Benson called Villages at Vigneto. Opponents argue that the pumping for 28,000 homes — along with a Tuscan-themed resort and golf courses — would threaten the river, and that federal officials have an obligation to thoroughly analyze the environmental consequences.

Developer Mike Reinbold has dismissed those concerns, insisting the development won't significantly affect the river. He has said the development will incorporate water-saving practices and use recycled water for outdoor irrigation, and will also support efforts to capture stormwater and use it to recharge groundwater.

Robin Silver of the Center for Biological Diversity, one of the groups that is suing, said an underlying problem is that officials at the state Department of Water Resources don't consider how groundwater pumping will affect surface flows when signing off on certificates of adequate water supplies.

"That's one of the reasons why we're losing the San Pedro. That's one of the reasons why we're going to lose the Verde. Because they keep permitting all these wells, knowing they're connected to the surface water, but they don't consider it," Silver said. "This is the quandary that we're having in Arizona right now, is we have no protection for our surface waters. Unless there is a direct diversion, our surface waters are screwed. And we have almost none left."

Scientists share these concerns and say the state's remaining riparian areas are at risk. Katharine Jacobs, director of the University of Arizona's Center for Climate Adaptation Science and Solutions, said aquifers should be managed to protect riparian areas that depend on groundwater.

"There actually is very little protection for water-dependent natural environments in Arizona," Jacobs said. "Arizona is really behind other states in that regard."

Conservation groups have repeatedly advocated for legislation that would add protection for “ecological water” in streams, but for the past two years, these bills have died without being heard.

One court case that could have far-reaching effects focuses on the San Pedro Riparian National Conservation Area, which was established by Congress in 1988 and includes about 40 miles of the river from the U.S.-Mexico border to St. David.

Lawyers for the federal Bureau of Land Management are seeking a set quantity of groundwater and surface water that they say is needed for the conservation area. A Maricopa County Superior Court judge could issue a decision on these federal water rights sometime next year.

Mapping wet and dry portions

In June, more than 100 volunteers fanned out along the river, walking the banks and wading through the shallow water. Using handheld GPS devices, they recorded whether each section of river was wet or dry.

This census of the San Pedro has taken place every June for the past 21 years. This year the river had a bit more water in it because of winter rains.

The survey, which is organized by the Nature Conservancy, takes the pulse of the river by capturing a snapshot during the driest time of year.

“Many reaches are stable. Some definitely are declining,” said Holly Richter, the conservancy’s Arizona water programs director. She added that some of the declines aren’t yet statistically significant over the 20-year period, but that “a lot of these places have gradual declines.”

The fastest declines in the river have occurred between Highway 92 and the U.S.-Mexico border. Richter said she’s unsure about all the factors behind these declines, but significant drops in the aquifer have also occurred south of the border in Mexico, where the copper mine in Cananea is one of the major pumpers sucking water out of the aquifer.

Just north of Highway 92, a different trend has emerged. Over the past two decades, Richter said, the segment of the river in Palominas has been the only part of the San Pedro that’s shown a significant increase in the stretches that have water.

This shift came about after a land deal in which the conservancy retired agricultural wells and pumps. Fields that were once green with alfalfa have been converted to cattle-ranching lands. Groundwater levels have rebounded.

The conservancy has also bought other farmlands and properties that were slated for development. Using conservation easements, the nonprofit group has ensured that high-volume wells are shut down, and that subdivisions won’t be built on these lands.

Richter said her organization wants to achieve a long-term balance, or “sustainable yield,” in the watershed.

Along with retiring some wells and promoting water-saving, the group has been working with local agencies to boost recharge into the aquifer.

They’ve used a simulation model to pinpoint locations to build recharge facilities, and they’ve teamed up on infrastructure that captures stormwater to replenish the aquifer. They’ve also used

treated wastewater from Sierra Vista's treatment plant, where the effluent soaks into the soil to replenish groundwater.

The effluent has formed a mound of water in the aquifer, Richter said, and the goal is to create a series of these underground water mounds that help buffer the river as the cone of depression around Sierra Vista continues to expand.

Cochise County officials in August signed an agreement that clears the way for using treated wastewater from the city of Bisbee. Richter said the agreement enables work to begin designing a recharge project near the border, including a 12-mile pipeline to bring the treated water.

She said it's crucial to keep putting more water into the aquifer. The cone of depression "is going to continue to spread until it gets to the river, and it's going to take years to do that," Richter said. "But decades from now, even if we don't pump another drop, the river will see increasing impacts from the historic pumping that has occurred here."

'We need to change the groundwater rules'

If you follow the river downstream to Benson, there are stretches that sit bone-dry except when rainstorms bring runoff roiling through.

North of Interstate 10, the river reaches the Narrows, a rock formation that divides the upper and lower San Pedro. For a short stretch passing through ranchlands, the river starts to flow again, forming a shallow stream with algae swaying in the current beneath towering cottonwoods.

In Cascabel, about 30 miles north of Benson, the San Pedro again becomes a parched riverbed snaking along the base of rugged cliffs.

Barbara Clark has lived here since 1970. Her property spans the riverbed and includes shady stands of mesquite trees. She has goats, a garden, and a workshop for making clay pottery.

Clark has seen the river change dramatically. During the past 15 years, she said, the water level in her well has dropped 10 feet. The stream, which used to flow intermittently much of the year, now only rarely has water.

"We're using our resources too fast. And I see it in my well," said Clark, who is a board member of the Lower San Pedro Watershed Alliance.

She walked down to the riverbed, where the sounds of chattering birds filled the trees. Many years ago at this spot, she recalled, the water was often shin-deep or waist-deep, depending on the time of the year.

She remembered going tubing and cooling off in shallow pools. She saw schools of longfin dace, a type of a silvery minnows, gliding through the water. As she talked of the frogs and turtles that used to flourish in the river, her eyes teared up.

"I took it for granted," Clark said. "But what's happened now, in the last 15 years more or less, is that it doesn't run 10 months of the year anymore. It runs when it floods."

Sometimes even the monsoon rains no longer bring back flowing water in this part of the river.

Seeing how this ecosystem has faded makes her feel sad and scared for the future.

“It’s a loss,” Clark said. “We’re supposed to be stewards.”

She wishes everyone along the river could simply learn to “live within our means” and keep the watershed in a balance. But she said Arizona may need legislation that requires leaving some water in rivers.

“I don’t think it’s fair to pump the groundwater so deeply that we dry up all our surface waters,” Clark said. “We need to change the groundwater rules here. And I think we need to recognize that our rivers and our natural systems have a right to exist, and we need them to exist.”

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Barbara Clark and her dog, Shep, walk along the dry bed of the San Pedro River in May on her property in Cascabel. MARK HENLE/THE REPUBLIC