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10 Percent of California's Water Goes to Almond Farming. That's Nuts.

By Eric Holthaus



This almond orchard is being grown in a desert.

Courtesy of Eric Holthaus

DENAIR, Calif.—In California's vast Central Valley, agriculture is king. But the king appears fatally ill, and no worthy replacement is in sight, as the area noticeably reverts into the desert it was little more than a century ago.

Signs line the back roads here that run parallel to wide irrigation ditches:

“Pray for rain”

“No water = No jobs”

As I've already discussed in the [Thirsty West series](#), city-dwelling Californians are a bit insulated from near-term water shortages thanks to the state's [intricate tentacles](#) of aqueducts, pipelines, and canals that divert water from the snowcapped Sierras to the urban core along the coast. Rapid population growth looms ominously, but for now, you'll still be able to brush your teeth in Oakland and Burbank.

By all accounts the current water crisis is far more urgent in the sprawling fields of the Central Valley. And that's bad news for those of us who enjoy eating daily. Two simple facts explain why: California is the [most productive](#) agricultural state in the union, and agriculture uses [80 percent](#) of California's water. In a year with practically none of the stuff, that's enough to send ripple effects throughout the country.

California is the nation's leading producer of almonds, avocados, broccoli, carrots, cauliflower, grapes, lettuce, milk, onions, peppers, spinach, tomatoes, walnuts, and dozens of other commodities, according to a 2012 Department of Agriculture report ([PDF](#)). The state produces one-third of our vegetables and two-thirds of our

nuts and fruits each year. While fields in iconic agricultural states like Iowa, Kansas, and Texas primarily produce grain ([most of which](#) is used to fatten animals), pretty much everything you think of as actual food is grown in California. Simply put: We can't eat without California. But as climate change–fueled droughts continue to desiccate California, the short-term solution from farmers has been to double down on making money.

Like many Americans, I'd never visited California's ultra-productive Central Valley before my monthlong drought-themed road trip for **Slate**. I wasn't quite sure what to expect besides lots and lots of fields. Having grown up in a small town in Kansas and living now in the heart of Wisconsin's dairy country, I'm plenty familiar with agriculture, but I've never seen anything remotely resembling the scale on which it's practiced here. Agriculture here isn't the endless fields of corn and wheat of my childhood. Thanks to California's [unique climate](#), fields here are comprised almost entirely of high-value cash crops.

Driving northward along California state Route 99 from Bakersfield to Fresno, we passed mile after mile of almond orchards, vineyards, and warehouses. There were enormous piles of hay on dairies the size of small towns. Citrus plantations extended to the horizon. And between them all was a crisscrossing network of irrigation ditches, most of which were dry. Coincidentally, this rural highway also bisects the heart of California's current mega-drought, in which three-quarters of the state is [currently rated](#) “extreme” or

“exceptional” by the USDA and National Oceanic and Atmospheric Administration. It’s pretty easy to see why this place is the epicenter of Western water issues. I ended up spending more time here than in any other stop on the trip.

Farmers in California are forced to irrigate because of a fundamental seasonal mismatch: The vast majority of the rain and snow comes in the winter and the best growing conditions (sunlight, warmth) of California’s temperate Mediterranean climate are in the summer.

This year, farmers have to make important decisions—and it often comes down to money. If given a choice between keeping fruit trees alive (which take years to mature and can bring [10 times more money per acre](#)), or planting rows of vegetables that live only a few months, that’s a no-brainer if you’re trying to maximize profit. This year, farmers are fallowing vegetable fields and scrambling to save high-dollar fruit and nut orchards. The result is counterintuitive: In the midst of the worst drought in half a millennium, the most water-intensive crops are getting priority.

California almonds use a stunning 1.1 trillion gallons of water each year, or enough for you to take a 10-minute shower each day for 86 million years (using a low-flow showerhead, of course). Here’s the calculation: California as a whole diverts or pumps 43 million acre-feet of water each year to supplement its meager rainfall. [In total](#), agriculture consumes 34 million acre-feet of that. (An

acre-foot is just what it sounds like: the amount of water needed to cover an acre of flat ground up to a foot, or about 325,000 gallons of water.) In 2013, there were 940,000 acres of almonds in California, according to the USDA ([PDF](#)). Each acre of almonds uses three to four acre-feet of water each year, most of which are delivered via river diversions or groundwater.



Almonds are one of California's most water-intensive crops, but during this year's epic drought farmers are planting even more. The reason? Economics.

Courtesy of Eric Holthaus

Almonds alone use about 10 percent of California's total water supply each year. That's nuts. But almonds are also the state's most lucrative exported agricultural product, with California producing [80 percent of the world's supply](#). Alfalfa hay requires even more water, about 15 percent of the state's supply. About 70

percent of alfalfa grown in California is used in dairies, and a good portion of the rest [is exported](#) to land-poor Asian countries like Japan. Yep, that's right: In the middle of a drought, farmers are shipping fresh hay across the Pacific Ocean. The water that's locked up in exported hay amounts to about [100 billion gallons per year](#)—enough to supply 1 million families with drinking water for a year.

Though [economics drive](#) the seemingly improbable logic of California's water exporting, that's no reason to rush to boycott almonds. As [this viral infographic](#) from *Mother Jones* shows, it takes more than a gallon of water to grow a single almond, and it may take 220 gallons of water to produce a large avocado. But pound-for-pound, there's [an order of magnitude more water needed](#) to get meat and dairy to your plate. A stick of butter requires more than 500 gallons of water to make. A pound of beef takes up to 5,000 gallons. More than [30 percent](#) of California's agricultural water use either directly or indirectly supports growing animals for food. (As *Slate's* L.V. Anderson [recently wrote](#), one of the single most effective actions to combat climate change would be if everyone in the world went vegetarian overnight. It would also likely wreck our economy.)

Later this year, as the effects of California's drought reverberate through America's supermarkets, they'll be what amounts to a de facto water tax: The biggest price increases will be found with some of the most [water-intensive crops](#).

Farmers here are turning to groundwater to make up the difference—and that's where things get worse. The shocking truth is, California is the last state that doesn't regulate groundwater pumping, even as supplies are dwindling. That means the motto around here right now is, to borrow [another *Mother Jones* headline](#): “Drill baby drill (for water, that is).” In some overpumped places, the ground has already sunk by dozens of feet. There are indications that the debate could be changing. [In April](#), a series of conservation bills were presented in the state Senate, with the intention of using the current crisis to address the issue of slipping groundwater supply.

The stakes are so high and the backlog for new water wells is so long that [some farmers are buying their own million-dollar drilling rigs](#), just to protect their massive investments. Wildcatting drilling crews are working 24 hours a day to keep up with demand.

California will never solve its water crisis if the aquifer keeps getting more and more holes to extract groundwater. But in dry years like this one, the state's agriculture would almost cease to be without groundwater. One short-term answer is more efficient methods, like drip irrigation. The problem is, irrigation technology has gotten so good that typically the end result is *increased* yields. And the more efficient the irrigation, the less water gets into the soil for groundwater recharge.

While agriculture isn't a monolith, you'd think an industry dependent

on water would be fighting for its survival by addressing the core of the problem. Yet some subsets of the industry seem to refuse to accept the new reality.

While I was in the Central Valley, I attended the Citrus Showcase in Visalia, an annual trade meeting sponsored by California Citrus Mutual. One farmer I spoke with there, Arlen Miller, seemed to almost take this year's drought in stride. "There's always been droughts, there always will be, and we're preparing as best we can." When I asked him whether he was concerned that the practice of drilling new wells during a drought might diminish the future supply of groundwater, he was matter-of-fact: "It's something that we can't control. Worry doesn't fix a whole lot."



We followed this water well drilling truck through a maze of almond orchards on the way back to the highway. Some farmers here have purchased their own million-dollar drilling rigs so they don't have to wait for a new well.

Courtesy of Eric Holthaus

A spokeswoman for California Citrus Mutual, Alyssa Houtby, confirmed that this year's drought has changed the way orange growers do business. "Now more than ever we rely on groundwater. That would not be a good situation if they start telling us how much we can pump. We're in a very dire situation. It's definitely a critical year. It's a turning point."

Miller brought the debate over increased water regulation to a personal level. "It's like someone cut in front of you in line at the In-N-Out. Some of my neighboring farmers that don't have groundwater will have to let their groves die. Ag is told to live without water and cities haven't been told that. Tell me, how many meals can you skip?"

In this corner of the valley, one farm is trying a different path. The outspoken family patriarch, Ward Burroughs, has been a leading advocate for the organic agriculture movement in California. His granddaughter is even featured [on the Organic Valley milk carton](#).

At first glance, this may seem like any other water-intensive large-scale farm. The Burroughs family operates hundreds of acres of almond orchards and three large dairies. While its choice of

crops is firmly planted in the present, it's challenging the status quo with an eye to the future.

My wife and I met Burroughs' daughter Benina Montes at the farm gate early in the morning. The day before we visited, a brief late winter rainstorm had pushed through, and the grass between the almond trees was a brilliant green. The almond trees were in bloom, and honeybee hives were scattered throughout the orchard to help with pollination. It was idyllic. We climbed into Montes' truck for a tour of the farm.

"We're leaving a lot of money on the table. Our production is down, but we're doing it the way we want to."

Benina Montes, of the Burroughs family

"Five of our six wells are run by solar, which supplies 80 percent of our energy needs," Montes explained. The farm covers a series of rolling hills, so it's logistically impossible to use diverted river water for irrigation. In this water-short year, they're cutting back on their cow herd and planting more almonds, a move that will help them use less water in the long term, though deciding between dairy and almonds is basically a lesser of two evils.

The farm is one of the few in the valley that produces almonds organically. In the rush to cash in on the almond craze, virtually all farms have sacrificed quality for quantity. Of the 2 billion pounds of almonds produced each year in California, only a few million are

certified organic, as they are at the Burroughs family's farm. Since almonds are already expensive, there's not much of an additional price premium for producing them in a more environmentally friendly manner. "People think we're crazy. Like, literally, we're leaving a lot of money on the table. Our production is down, but we're doing it the way we want to," Montes said.

The organic certification process doesn't require farmers to curtail water use, but the Burroughs decided to install the most efficient irrigation system they could anyway.

Burroughs said some of his neighbors, also almond growers, were too quick to expand their plantations and now, because of the drought, are having to plow some of them under. He told me that one farmer he knows just leveled 1,000 acres. But Burroughs thinks they're getting what's coming to them. "Those guys have dug their hole—they never did have enough water. I don't have any sympathy for those guys."

When Burroughs—whose long white beard brings to mind a modern-day [John Muir](#), the founder of the Sierra Club—told me his life story, it seemed to me to be a preview of the next few decades of California agriculture.

"I was born and raised in the Delta area, where saltwater intrusion is a huge issue," he said. "We had a big drought back in 75-76-77, so we moved the farm here. The water got too salty. You can't be in

agriculture if you have saltwater.” The memories of past droughts have pushed Burroughs to become an environmental leader. “You go organic because it’s the best thing for the whole world. Ten years ago I wouldn’t have said that, but that’s what it’s come down to. We all go through an evolution. I’m not apologizing for it anymore.”

He added, “What even makes it more important is, somehow, you got to figure out how to make the whole deal work. When you’re irrigating in the desert, it doesn’t make any sense. We’re doing this in the wrong place.”

But Burroughs doesn’t reserve his criticisms only for industrial-scale agriculture. He thinks Californians have outgrown their state. “The water system [in California] was set up for 20 million people. Now, you’ve got 39 million going to 50! Those guys down there in the city, they just want to live the good life. But more people equals more votes. You’ve got no political power where the water is, so you’ve just got to live with it. The biggest benefit of having this drought is that in order to get things fixed, you have to have things go a little haywire.”

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Burroughs isn’t alone in this feeling. In my next *Thirsty West*, I’ll examine the tense urban-rural divide when it comes to California water politics, which is coming to a head during this year of extreme

drought.







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Tucson, Ariz.

Tucson, Ariz.

Nogales, Ariz.

Las Vegas, Nev.

Death Valley

Sequoia National Forest

Hanford, Calif.

Denair, Calif.

Tulare, Calif.

Oakland, Calif.

Oakland, Calif.

Sheridan, Ore.

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