

**BAY AREA WATER SUPPLY AND CONSERVATION AGENCY
BOARD POLICY COMMITTEE MEETING**

September 9, 2016

Correspondence and media coverage of interest between August 9, 2016 and September 9, 2016

Media Coverage

Water Policy:

Date: September 5, 2016
Source: Water Deeply
Article: Here's What's Happening to All That Water Bond Money

Date: September 1, 2016
Source: Daily Journal
Article: Law to crack down on water guzzlers: Gov. Jerry Brown signs Sen. Jerry Hill's drought inspired Legislation

Date: August 31, 2016
Source: San Jose Mercury News
Article: California water guzzlers to face new penalties, possible public disclosure of names

Water Supply:

Date: August 10, 2016
Source: NBC Bay Area
Article: Lack of Water Freezes Development in East Palo Alto

Drought:

Date: September 7, 2016
Source: Associated Press
Article: Californians still saving water in drought, but not as much

Date: August 31, 2016
Source: SF Chronicle
Article: California farm revenue plummets after years of drought

Date: August 29, 2016
Source: Climate Central
Article: Drought-Hardy Yards Could Ease Californian Heat Waves

Water Management:

Date: September 6, 2016
Source: Water Deeply
Article: Why a New Water Recycling Plant is Good for Wildlife

Date: August 9, 2016
Source: SF Chronicle
Article: Hetch Hetchy's Mountain Tunnel to close for repairs

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Here's What's Happening to All That Water Bond Money

Most of the \$7.5 billion water bond approved by California voters in 2014 still has not been spent, even though the state's drought continues. Policy expert Ellen Hanak explains why.

Water Deeply | September 5, 2016 | Matt Weiser

Almost two years ago California voters, in the midst of a historic drought, passed Proposition 1, a \$7.5 billion bond measure intended to ease water shortages by funding new projects.

At this point, many Californians are wondering where all that money went.

Most of it hasn't gone anywhere, yet. According to a recent report by the Public Policy Institute of California (PPIC), just 2 percent of the bond money has been spent so far – about \$177 million. The rest awaits a lengthy process of vetting funding requests.

The slowest part involves \$2.7 billion set aside in the bond for water storage projects. And these cannot solely benefit water users. This money can be spent only on the portion of such projects considered “public benefits.” Proposition 1 directs the California Water Commission to define what this means, a process expected to conclude in December 2016.

To help explain the bond status, Water Deeply spoke with Ellen Hanak, director of the PPIC's Water Policy Center, who is tracking the process.

Water Deeply: Has any of this new bond money helped ease the drought?

Ellen Hanak: That could mean different things in different sectors. What we know is that there's been a lot of effort to try to deal with some of the problems that small, disadvantaged communities are facing with water supply, and in some cases with water quality. There are various pots of money available for that. But it's my understanding what has gone for safe drinking water is related to supply reliability in some of these communities.

For the urban agencies, the understanding was when some of the bond appropriations were accelerated it was going to be investments that would help boost resilience, which is a little bit different from so-called emergency situations. That would be like a water recycling project that includes a cost-share from the state. None of that can come online immediately, but if this drought continues, it'll help ease the impacts when those come online. And it'll certainly boost resilience for future droughts.

This bond is not about tackling emergency problems. But by and large, there haven't been that many emergencies, and they've been managing those pretty well. So, it's more about boosting resilience for longer-term droughts and future droughts.

Big investments take time. So in the very near term, it's not feasible to think that you can put millions and millions of dollars into investments that are going to immediately address drought problems. That's why we need to think about building drought resilience as an ongoing effort rather than something that you just sort of address from one day to the next.

When people talk about surface storage projects (reservoirs), even once you get a project approved, it takes time to build it. That's going to be true for a new recycling facility or a desalination facility. The things you can do more quickly are smaller and less complicated.

Water Deeply: Why does it take so long to spend this money?

Hanak: When voters approve a bond act, it doesn't have specific projects earmarked. It has categories of spending and there are some rules set into the bond language about what can be eligible in a very broad way. Then, when the bond gets approved, that's when the detailed work of determining specific eligibility criteria in the different areas starts.

The way we spend our bond money, it's not that money that goes out and builds things. It's really a way of providing state matching funds for projects that are done at the local and regional level. It's a process where money is made available and the state, with a lot of public input, develops the guidelines for people to submit proposals. Then there's a competitive process for that money.

There's a tension between getting money out the door really fast and having a transparent, fair process that allows enough public input into what the criteria should be, and then gives people time to apply for it. That part of it is often something that folks who are not close to the process just might not be aware of. They might think, when they're voting for a bond, "OK, everything is all laid out in detail as to how this is going to be spent." But it's not. It's really more about categories of things that people think are important.

Water Deeply: A lot of people are interested in money for water storage projects. Why don't we have projects approved and ready to receive this money?

Hanak: The bond language was very specific about the process that needed to happen, and we're on track with that. There actually have been some stakeholders who have been saying they need more time, because they won't be ready in January 2017 to submit applications for money for the storage projects. Those projects are going to require locals to demonstrate how their projects should qualify for these matching grants.

This is another thing people often don't realize with these storage projects: The bond money is for only up to half of the project and only for the "public benefits." They can't just cover water supply for cities and farms. That's the part to be covered by other funds, primarily local funds. Folks are hoping they may be able to get some federal cost share to come in there, but local funds are definitely going to have to be the major part of it.

The bond language foresaw that it was going to take time to flesh out the eligibility criteria because of this innovation in the bond, which is that the state is funding only the "public benefits." And we need a clear definition of how you measure that in a multi-benefit storage project, which is the work that's being done now by the Water Commission.

I suppose you could say, "Why didn't we do that work before the bond was approved?" But that would be doing a lot of work without knowing if you would even have money to spend on that.

I will say, it's not as if storage projects haven't been occurring. If you look at urban Southern California, between the early 90s and the beginning of the drought, they increased their storage by a factor of 13 to 14 times. That's very significant. Above ground, that included the Diamond Valley Reservoir. It included an increase in the capacity of surface storage in San Diego. But it also included an extensive amount of investment in groundwater storage around the region and outside, including the Kern County Water Bank. Up in the Bay Area, the Los Vaqueros Reservoir was initially built and then expanded. A lot of that was with local funding.

State funding is an important incremental source, but it's not the primary source. Investments are happening as we speak with various kinds of funding including, in some cases, money remaining from earlier water bonds.

Water Deeply: What are these "public benefits"?

Hanak: The bond language laid out the categories in a broad way – things like flood management, ecosystem management. But the nitty-gritty of what that means in the context of a detailed grant proposal and how you do the accounting for it, that's been the work of the Water Commission. And in the regulations that are on track to be finalized by the end of the year. That's a big pot of money and that's an issue that a lot of folks care about around the state.

Water Deeply: Is this focus on public benefits a groundbreaking idea?

Hanak: We've looked at how we've been spending money from past bonds. There was a lot of funding that was specifically allocated to the environment as well as some areas that one could definitely say are public benefits: things like water-quality management and environmental protection. So a lot of the bond money has been going to things that, I think, everyone could agree are public benefits.

Thinking about a project and how the benefits break out between the environment and water users is much more explicit in this process. And so it's required a lot more careful planning. Figuring out how to do that accounting isn't easy, particularly because some of the public benefits are not as easily measured as the water we use for cities and farms.

Critically, what has to happen for those kinds of projects is, you've got to know who the partners are who can be putting up the other 50 percent of the public benefits, as well as fleshing out what those public benefits are going to be and how the money you're asking for relates to that. Folks who are looking at it from a little bit more distance probably would be surprised to realize how much legwork is needed to flesh all that out.

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Law to crack down on water guzzlers: Gov. Jerry Brown signs Sen. Jerry Hill's drought-inspired legislation

Daily Journal | September 1, 2016 | Samantha Weigel

If you want to be careless with water while others conserve, you may have to pay for it.

Inspired by a San Mateo resident also fed up with hearing stories about those not abiding by conservation mandates, state Sen. Jerry Hill, D-San Mateo, has passed the first statewide law requiring excessive water users be penalized during droughts.

On Monday night, Gov. Jerry Brown signed Hill's Senate Bill 814 — a law cracking down on water-guzzlers who aren't abiding by orders to curb consumption. When conservation standards are in effect, the bill requires suppliers to do one of two things. Either enact a tiered-rate structure that charges more to customers who use more, or establish an excessive use ordinance. In the latter, customers could be charged \$500 for every 748 gallons they use above the excessive use definition.

And for some greedy gulpers, their names could be made public — a “shaming” tactic formerly used by an East Bay utility to highlight those who weren't conserving, according to Hill's office.

Residents living under an excessive use ordinance, and who don't mind their taps, could have their bad behavior exposed by anyone who makes a public records act request for the supplier's list of rule breakers.

The bill was inspired in part by stories about excessive water consumption, the most egregious of which included a Southern California resident found using 12 million gallons in a year, Hill said.

“Now, everyone in California will share in the pain if there's a statewide drought,” Hill said. “It just goes after the egregious individuals who chose to ignore the fact that when we are in a drought, we all need to sacrifice.”

The bill goes into effect Jan. 1, 2017, and would kick in either when there is a statewide drought declaration with conservation mandates, or when a supplier determines regional conditions are affecting supplies, according to Hill's office.

Beginning in 2014 and made permanent this year, the state prohibited residents from certain wasteful water uses; such as washing down a car using a hose without a shutoff nozzle or watering landscape within 48 hours of it raining. Those caught wasting water could be fined \$500. However, there wasn't any recourse or financial penalties against those who used excessive amounts of water, according to Hill's office.

Although the state had implemented landmark conservation mandates seeking a cumulative 25 percent reduction — orders which have since been lifted as supplies improved with last winter's storms — many residents were still able to use an excessive amount of water without penalty, Hill said.

“If I let my hose run into the street, I'd be fined \$500, but if I used 500 gallons of excess water, than I wouldn't be fined. That's not fair. This [bill] makes it fair and equitable so we're all treated equally for violating the standards and conditions of a drought, which is that we all have to conserve,” Hill said. The bill was drafted based on a San Mateo resident's suggestion in Hill's “Oughta Be A Law Contest” and initially had provisions requiring the names of egregious users be made public. The East Bay

Municipal Utility District had posted a list of nearly 1,000 water guzzlers and claimed nearly two-thirds of them subsequently cut their use, according to Hill's office.

Although the "shaming tactic" language was stricken from the bill, the new law could lead to some utilities being required to make public the names of those who violate excessive use ordinances.

"The shaming aspect or naming those who use excessive water in the state, was removed from the bill. However, it is now in the bill indirectly because it requires water agencies to adopt an excessive water use policy and that policy creates violations," Hill said. "Public records act will apply to any violators of a regulation or law or ordinance. So this creates the conditions to allow for ... anyone to look for those violators."

Local impact

In San Mateo County, most agencies are unlikely to make any significant changes to their policies once Hill's law goes into effect because no suppliers are currently mandating cutbacks — a factor that triggers the new requirements.

Furthermore, the vast majority already have tiered rate structures enacted during the drought. Most residents find their rates increase the more they consume, according to a survey of 2014-15 rates conducted by the Bay Area Water Supply and Conservation Agency, or BAWSCA.

All but three local suppliers increased charges per hundred cubic feet as residents consume more, according to BAWSCA.

"[Local suppliers] really don't have to comply yet. But I am sure my agencies will comply in the event that a future drought occurs. Because many of them did adopt rate structures during this drought to encourage conservation practices," said BAWSCA CEO Nicole Sandkulla.

In response to concerns raised by water providers and acknowledging California's diverse hydrology — wherein some regions continue to be stricken by severe drought while others have adequate supplies to meet demand — water officials called off state-mandated conservation targets in June.

Instead, individual suppliers self-certified their targets based on resources. Now, all San Mateo County residents are under voluntary cutbacks — a move primarily driven by the region's main supplier, the San Francisco Public Utilities Commission.

As the State Water Resources Control Board prepares to consider permanent regulations next year, Sandkulla noted many local suppliers are in the process of stepping away from their drought rate structures and suspending excess use surcharges.

But while Hill's bill may not have an immediate local impact after going into effect, Sandkulla said she's confident locals' thrifty water habits leave them well poised to adapt when necessary.

"The customers that are served by the Hetch Hetchy regional water system in this area, they really did an exceptional job of responding to an urban call to reduce water use, despite the fact that they have some of the lowest water consumption per capita," Sandkulla said. "But we're still in a state that's subject to droughts ... and we're continuing to ask our customers to conserve."

California water guzzlers to face new penalties, possible public disclosure of names

San Jose Mercury News | August 31, 2016 | Paul Rogers

SACRAMENTO -- California's top water guzzlers -- the people who use tens of thousands of gallons more than their neighbors to keep lawns bright green during serious droughts -- could soon be hit with higher water bills and their names made public if the drought continues.

A law signed late Monday by Gov. Jerry Brown requires retail urban water suppliers with more than 3,000 customers to put in place rules that define "excessive water use" and impose them during drought emergencies.

The cities, water districts and private water companies have two choices:

They can impose tiered rates that charge a higher amount to people who use more than a certain target, as San Jose Water Co. and some other providers are already doing this year. Or they can put in place a fine for households using more than a set amount, which then triggers a requirement in state law mandating that their names be made public.

"Households that guzzle water -- while their neighbors and most other Californians abide by mandatory reductions -- will no longer be able to hide and persist in their excess," said state Sen. Jerry Hill, D-San Mateo, who wrote the measure.

Hill said he pushed the bill, SB 814, after reading about a few individual customers who blatantly disregarded calls for conservation during the current drought, such as one Beverly Hills homeowner who used 12 million gallons of water last year. Some water agencies charge the same amount per unit of water no matter how much water a customer uses, which allows wealthy homeowners to simply write a check and continue the practice.

The bill was supported by environmental groups such as the Sierra Club, along with the East Bay Municipal Utility District.

The district, which serves 1.4 million people in Alameda and Contra Costa counties, last year passed an "excessive water use ordinance" that penalized households using 984 gallons of water or more per day, which is four times the district's average household use of 246 gallons per day.

The ordinance charged a penalty of \$2 per water unit (each unit is 748 gallons) for all use above 984 gallons a day. Although that amount didn't result in sky-high bills for the district's most heavy water users, it did trigger a requirement in the state Public Records Act that the names of water customers who are fined for excessive use be made public.

Normally, water bills are not public record.

A number of celebrities and business leaders -- including Oakland A's executive Billy Beane, of Danville; Motley Crue lead singer Vince Neil, of Lafayette; and Chevron vice president George Kirkland, of Danville -- all turned up on the list of water wasters.

"For us, it wasn't perfect, but it did get people's attention and provided more opportunities for conservation," said East Bay MUD spokeswoman Andrea Pook.

"Most of them were never on the list again," she said. "We don't have any hard data about how much of it was public shaming, and how much of it was financial. People are motivated by different things."

After winter rains boosted supplies, East Bay MUD dropped the excessive use ordinance for this summer.

The new law will be required anytime California is in a drought emergency as declared by the governor, and when a water agency is subject to mandatory conservation from the state or from its own water management plan. California remains in a drought emergency that Brown declared in January 2014.

And from June 2015 to May of this year, the state imposed mandatory water conservation targets on cities and water districts, with potential fines for agencies that failed to meet them.

Brown's State Water Resources Control Board lifted those rules in June, however, allowing local agencies to set their own targets because winter rains improved the water picture in some parts of California. But Brown administration officials have said they could bring back the mandatory targets starting in January if statewide conservation levels fall and rains don't materialize this upcoming winter.

That would kick in the rules required under Hill's measure.

The bill was opposed by the Association of California Water Agencies, which argued that because drought conditions have eased enough for Brown to drop mandatory water conservation targets that he had previously imposed on cities statewide, the bill "would institute an unnecessary mandate."

In a letter, the association called the bill "a top down statewide approach," arguing that "local control is the most effective path to mitigating the effects of drought."

One complicating factor: If a local water agency chooses to use tiered rates, rather than a penalty with public disclosure, to punish excessive water users, it could run afoul of a recent court decision. Last year, a state appeals court ruled that tiered water rates are unconstitutional if they charge more for water than a water agency spends to provide the service.

That didn't invalidate tiered rates, but it required water agencies to begin documenting much more specifically how they arrived at those rates -- spending more to drill a new well or buy water from out of the area, for example, to justify the higher tiers.

But Hill says there's only so much water -- and water used on lawns in excess means less to fight fires with or use in hospitals and other important needs.

"Water is a limited resource," he said. "We have to take droughts seriously. All of us. Just because you can afford your way out of it, that's not right."

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Lack of Water Freezes Development in East Palo Alto

Critics say not all is equal when it comes to water distribution in the Bay Area

NBC Bay Area | August 10, 2016 | Stephen Stock, Michael Bott and Jeremy Carroll

Lack of water has forced East Palo Alto to freeze proposed developments that would provide jobs and help its residents economically. Critics of the system that resulted in the water shortage say it's not by accident.

East Palo Alto's city manager says plans are currently on the table that would bring jobs, growth and even a Mark Zuckerberg funded private school to a community that hasn't shared in the prosperity of its affluent neighbors along the Peninsula. The only thing stopping them: A lack of water.

East Palo Alto is currently using 100 percent of its water allocation from the San Francisco Public Utilities Commission (SFPUC). That means the city has had to put a freeze on 11 new expansion projects because there's not enough water for those projects once they are built. With very real opportunities to bring jobs, tax revenue and growth in reach, the lack of water has frustrated city officials, private developers and venture capitalists alike.

"It's the lack of water access in this city that is a surprising barrier to the economic development of this place," said Bay Area venture capitalist Stephen DeBerry.

DeBerry, who is investing in several East Palo Alto projects, is the founder and chief investment officer at Bronze Investments, a company he founded out of an East Palo Alto home in 2009. DeBerry sees opportunity in the city he says has been left behind by the whiter, richer communities of Silicon Valley. But the lack of available water for development stands in the way.

"We are in the middle of Silicon Valley," DeBerry said. "We are in the middle of what is arguably the largest wealth creation event in human history and this community of East Palo Alto has been on the margin. This is not unique. For those who don't know, East Palo Alto is across the freeway from Palo Alto. More lower income people are here, more people of color are here, and this is by design. The story of East Palo Alto is broadly writ the story of East Oakland, East LA, East Philly and East St. Louis."

According to US Census data, East Palo Alto's population is more than 76 percent Hispanic and African American. The average household income in the city is two-and-a-half times lower than its neighbor Palo Alto where more than 86 percent of residents are white or Asian.

The origins of the predicament East Palo Alto finds faces today goes back more than 30 years, when the SFPUC agreed to provide 184 million-gallons-per-day (mgd) of water to a group of 26 cities, water agencies and private utilities in the Bay Area.

While the SFPUC provided the guaranteed supply, it was left up to the group to divvy up the water amongst themselves. The agreement required separate actions by each of the 26 governing bodies. East Palo Alto was given a small permanent allocation of 1.96 MGD, an amount they've exceeded several times in the past 10 years.

The Bay Area Water Supply and Conservation Agency (BAWSCA), enabled by the legislature in 2003, currently represents the interests of those 26 wholesale customers.

BAWSCA's CEO Nicole Sandkulla acknowledged the urgency of the situation for East Palo Alto in an interview with NBC Bay Area and a public statement recently released by the agency.

"[East Palo Alto's] limitation has remained for the past seven years, and a decision about its request by the SFPUC is scheduled by 2018 as part of a long-term planning process," Sandkulla said in the statement. "Meanwhile, [East Palo Alto's] request remains on hold. More water is available, however, and BAWSCA strongly supports [East Palo Alto's] request to get now what it needs."

East Palo Alto city manager Carlos Martinez said it's a problem the city can't conserve their way out of. The city already uses less water per capita than any other city within BAWSCA. For example, East Palo Alto uses only 56 gallons of water per person per day, compared to the town of Hillsborough which uses more than 300 gallons per person per day.

"It's not that we are using huge amounts of water or anything," Martinez said. "We cannot ask our residents anymore to have a one-day-a-week shower. They're taking short showers. They're letting their lawns go brown. We're conserving as much as we can."

Martinez said the city is expanding its own groundwater supply by bringing two wells into production, but those projects will take several years to complete and the city has projects ready to build immediately. The city has also requested the SFPUC provide an additional 1.5 MGD guarantee to East Palo Alto on top of the 184 MGD it already provides the BAWSCA agencies.

Yet the SFPUC says it's not inclined to increase East Palo Alto's allocation because the BAWSCA agencies as a whole have enough water to go around. In fact, the SFPUC points to projections showing BAWSCA won't even be using all of its 184 MGD allocation by 2040.

Steve Ritchie, Assistant General Manager of Water Enterprise for the SFPUC, said the agency can't justify expanding BAWSCA's allocation given those projections. Instead, he said East Palo Alto should come to an agreement with another BAWSCA agency.

"That's not the job in San Francisco to make sure it's equitable among the customers," Ritchie said. "That was left to the customers. The mechanism that exists under the agreement that allows for that kind of change is the transfer of individual supply guarantees from one customer to another."

State Senator Jerry Hill recently wrote a letter to the SFPUC supporting East Palo Alto's request for an addition 1.5 MGD, but he concedes it's more likely the city will have to secure a water transfer from another BAWSCA agency instead. He said he's willing to help facilitate that process given the importance of expansion for East Palo Alto.

"They're up against the wall and they need water and quickly, especially in terms of this economic success that we're feeling" Hill said. "The development potential for East Palo Alto is strong. It's there, but it's going to die unless we get some water."

Hill said public officials didn't always see East Palo Alto as a city with potential for growth and development, which helps explain why they got such a low water allocation in the first place. He said that was a mistake - one it's time to correct.

“They looked at it as a poor community, a poor community of color,” Hill said. “They didn’t see the potential there.”

DeBerry said he hopes neighboring cities that use significantly more water than East Palo Alto will step up.

“The neighboring communities, who are using up to six times more water than East Palo Alto, many of them have a surplus of water that they’re not even using,” DeBerry said.

Some cities have already expressed a willingness to work with East Palo Alto on some sort of water transfer. Mountain View’s city manager recently wrote a letter expressing willingness to work with East Palo Alto to address the city’s long-term water supply. The letter stated Mountain View was hopeful it could transfer .5 MGD to East Palo Alto, enough to alleviate the immediate development freeze.

Palo Alto’s city manager James Keene also said his city is also exploring a potential deal with their neighbor.

“Our council is very cognizant of the special relationship we have and the fact that there are important needs that EPA has,” Keene said. “And I know that we’re inclined to certainly be supportive and responsive.”

DeBerry said he’s hopeful these agreements will come to fruition, but he doesn’t want to wait years to see it happen.

“It’s not a question of whether we have enough,” DeBerry said. “It’s a question of where the water is distributed, which is why it’s more of a moral, ethical, social question than one of resource. I think either of those avenues would be wonderful. At the end of the day, here in East Palo Alto, we don’t care how we get there. We’re thirsty. We need water now.”

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Californians still saving water in drought, but not as much

Associated Press | September 7, 2016

SAN FRANCISCO – Californians are still saving water despite the recent lifting of mandatory statewide conservation, but not as much as they were last year at the peak of the drought, water officials said Wednesday.

Monthly figures showed water conservation in cities and towns statewide dropped 1 percent in July from the previous month.

July water-savings were down 11 percent from July 2015, which marked peak urban water conservation under last year's mandatory 25-percent statewide cutbacks for cities and towns.

The state Water Resources Control Board began lifting the statewide cutback order in the spring after an El Nino weather pattern brought near-normal rain and snow to Northern California.

Water board member Steven Moore stressed on Wednesday that California households and businesses are still using significantly less water than at the start of the five-year drought, even though the state's population has increased by more than 3 percent since 2013.

"These are promising trends and it's good to place this in context," Moore said.

Drier and hotter Southern California, which gets much of its water from Northern California rivers, marked one of the bigger drops in conservation last month, saving 16.9 percent compared to 28.2 percent in the same month last year.

This year's welcome wet winter filled many state reservoirs, although four-fifths of California remains in drought. State water officials in June turned conservation efforts back over to local leaders, putting them in control of how much water their residents and businesses should conserve, if any.

More than 80 percent of the state's water districts told the water board earlier this summer that they have adequate supplies to handle continued drought and should not be subject to mandated conservation targets.

Officials continue to urge conservation statewide, however, not knowing if this coming winter will begin to erase the extended drought or plunge the state back into the dry spell.

Water officials say they are monitoring monthly water use figures and may adjust conservation requirements after January.

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California farm revenue plummets after years of drought

SF Chronicle | August 31, 2016 | Marissa Lang

Farmers in California lost more than \$9 billion in revenue last year as the ongoing drought forced them to fallow fields, shut down farms and cut labor costs.

The figures, reported Tuesday by the U.S. Department of Agriculture, come amid warnings that a fifth year of drought could continue to drive down agriculture earnings and ultimately hurt the state's economy. Agriculture officials predict a continued downward trend in farm revenue this year.

In the first four years of California's historic drought, which pushed the federal and state governments to halt or slash deliveries of water to several water districts throughout the Central Valley, farmers were able to shore up their revenue using several controversial strategies.

Pumping groundwater to make up for the loss of state- and federally allocated water has caused the valley floor to sink. Turning to high-yield crops like almonds, which bring in more dollars per gallon of water than many other crops, helped farmers maintain a revenue stream even as they stopped tilling fields and fired workers.

But that strategy can go only so far.

The 2015 numbers show farmers may have reached their limit, and Manuel Cunha, president of the Nisei Farmers League in Fresno, expects matters to worsen in the years to come.

"When you take out a million acres of farmland that's literally being dried up, that's dollars gone on all fronts," Cunha said. "Not just on the sale of a product or a crop, but in state taxes, workers spending those dollars in the communities where they live, schools collapsing because there aren't enough students because all their families are leaving. It's a big hit."

California, which is the leading agriculture exporter in the U.S., supplies more than half of the country's fruits, nuts and vegetables, and dominates the dairy industry with 19 percent of milk coming from the Golden State.

Farms in the state earned \$47.07 billion in 2015, down nearly 17 percent from the year before, when they brought in a record \$56.61 billion, according to the Department of Agriculture.

Nationally, agriculture revenue fell from \$424.14 billion to \$379.17 billion over the same period — about an 11 percent drop. The department predicts a continued loss of 7 percent of the nation's agricultural revenue in 2016.

California's losses were most pronounced in dairy production, rice, corn, cotton, fruits and nuts. But another contributing factor was a drop in price for milk and tree nuts, two California crops that are among the top moneymakers. The state's dairy industry saw a drop of more than \$3 billion last year, and almond sales have dropped from more than \$7 billion to \$5 billion.

Rice, which took a hit of \$341 million in 2015, is the most water-intensive crop and the fourth-biggest user of water in the state. When water becomes too expensive or hard to come by, farmers stop growing it.

An estimated 540,000 acres of farmland were fallowed in 2015, continuing a trend of forgoing crops in the face of dwindling water supplies. Permanent crops, like tree fruit and nuts, which cannot be fallowed, were taken out of production at rates Cunha said he has never seen before.

“In California, we’re ripping out vineyards, we’re ripping out tree fruit, we’re ripping out other crops that you can’t just replace,” he said. “When you do that, you’re lowering your production.”

Cunha worries about the long-term and far-reaching impact on future production and farmers’ inability to rebound from the damage the drought has wrought.

Fallowed land can be brought back so long as it is maintained, but some farmers stretched to their financial limits have been unable to do so. Cunha said it’s not unusual for that land to become permanently unusable.

More than a million farmworkers — who lost their jobs and, in some cases, their homes as farmers cut production — have left the country since 2009, according to the Pew Research Center. In 2014, experts estimated that more than 17,000 farm jobs in California had been lost due to drought.

“When you have a tremendous amount of land being taken out of production, those farmers have less to farm and need less people to farm it, so people lose their jobs. When people lose their jobs, they leave,” Cunha said. “We’ve had people leaving — the valley, the state, the country — for years. That’s not going to stop until the work comes back. I don’t see that happening in 2016 or 2017. It’s bad. Everyone (in California) should be worried about this.”

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Drought-Hardy Yards Could Ease Californian Heat Waves

Climate Central | August 29th, 2016 | John Upton

As drought-stricken residents of Los Angeles's hottest neighborhoods replace thirsty lawns with native plants, pavers and bare soil, new research has shown how their local climates could begin tipping back in the direction of their desert-like origins.

In a region beset this year by drought and powerful heat waves, the widespread adoption of drought-proof landscaping is expected to bring warmer days — and much cooler nights. Overall, experts say the changes would help to protect residents from heat waves, which are being made worse by global warming.

California, naturally prone to drought, is enduring the fifth year of a historically bad one. Droughts are projected to intensify in California as temperatures rise, reducing mountain snowpacks and soil moisture and potentially altering weather patterns.

To cut water use, utilities and agencies have been helping Californians swap out their lawns for drought-hardy native landscapes. The L.A. Department of Water and Power says more than 24,000 of its water customers have worked to make the switch since 2009.

"You can see the beginnings of some real change in landscaping practices," said Alex Hall, a professor at UCLA who studies regional and global climate change.

Done at a large enough scale, University of Southern California research published in Geographical Research Letters this month shows how the landscaping changes could affect the weather.

Worsening heat waves are among the clearest and deadliest effects of climate change. The research focused on July temperatures, when heat waves in southern California can be oppressive, taking their heaviest tolls on the elderly, the sick and the poor.

"We were interested in understanding these impacts on a summer month," said George Ban-Weiss, who researches relationships between local and global climate and who led the new study. "One of our concerns is the health consequences of extreme heat, so we wanted to be sure to study a hot baseline period."

Using models, Ban-Weiss and a colleague found that replacing lawns and grassy parks with native bushes and other drought-hardy landscapes would increase daytime temperatures throughout the metropolitan area by 1.3°F on average. That's largely because irrigation water acts like sweat, cooling down landscapes.

The study helps to inform a 'what if' thought experiment, in which a future L.A. morphs back toward its original state, free of irrigation, driven by worsening Western droughts.

The findings may also be relevant to other cities where soils are wettened during summer more by sprinklers and hoses than by rainfall.

In the suburban San Fernando Valley, where temperatures are among the highest, and where the natural environment was described in the 1880s as resembling that of a desert, daytime temperatures were projected to rise the most — by 3.4°F.

That would seem to be bad news. Greenhouse gas pollution has warmed the planet's surface nearly 2°F on average, and natural weather cycles have caused the West to warm faster than most other places in recent decades. Compounding the problem is the urban heat island effect, with concrete causing L.A. and other cities to warm faster than rural regions.

But there was a nocturnal twist to the findings.

"If you stop irrigating, you're making the system go back to the arid system that it really is," said Abigail Swann, a University of Washington ecoclimate researcher. "If you've spent any time in arid places, you know that they cool very quickly at night and they also heat very quickly during the day."

At night, the modeling projected a cooling effect from the changing landscapes that would be exceed the daytime warming effect. Across L.A., nighttime lows were projected to fall by an average of nearly 6°F if irrigation suddenly ended.

That's a key finding, because nighttime lows help people recover daily even as heat waves persist. From a public health perspective, the findings point to a "net positive," said Patrick Kinney, a professor who directs Columbia University's climate and health program.

"It's generally thought that nighttime minimum temperatures are more important for health risks than daytime highs during extreme heat events," Kinney said.

Most of the water used in Los Angeles is piped in from other counties and regions, and most of that is used to water lawns and gardens. The new findings show that cutting back on irrigation in the low-rainfall metropolis could do more than just save water and the energy needed to transport it — it could save lives.

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Why a New Water Recycling Plant Is Good for Wildlife

Water Deeply | September 6, 2016 | Meghan Hertel

A water recycling plant in the Central Valley will provide water to farmers and wildlife refuges. The water comes at a critical time for waterfowl, which have suffered during California's five-year drought, says wildlife expert Meghan Hertel.

As a blistering California summer comes to a close, winter rains seem long ago. But for Central Valley wetlands and wildlife, a moderate El Niño winter and a new creative water project are hopeful signs after years of brutal drought.

On August 26, the Bureau of Reclamation and the Del Puerto Water District broke ground for a water recycling project to take treated water from Modesto and Turlock across the Valley in a new pipeline, to be shared among South of Delta farmers and wildlife refuges. Eventually, the project will provide up to 48,000 acre-feet (59m cubic meters) of drought-proof supply, with one-quarter going to wetlands and the rest to farmers.

This is truly a win-win project and it couldn't come at a more critical time.

In 2014 and 2015, Central Valley wetlands received little to no water during the spring and summer, leaving parched and barren ground. This year, winter rains gave new life to these places. However, this temporary rebound hinges on our ability to deliver water in future dry years.

Prior to the Gold Rush, the Central Valley was a vast network of wetlands. Today, only 5-10 percent remain. Most depend on the Central Valley Project to deliver the water that represents their lifeblood. Today, these wetlands are only wet if we give them water.

Because we have lost so much wetland habitat, the importance of the remaining wetlands is magnified – they support 60 percent of the Pacific Flyway's migratory waterfowl and 20 percent of the entire North American population of waterfowl.

The environment and wildlife have felt the impact of the drought along with the rest of us. In 2014 and 2015, tens of thousands of acres of dry San Joaquin Valley wetlands contributed to a 42 percent reduction in breeding mallards. Without water, resident birds struggle to successfully raise young.

Dry wetlands in spring and summer also stunt the plants that feed millions of ducks, geese and other species during fall and winter migration – potentially leading to overcrowding or malnourished and unhealthy birds.

With La Niña conditions brewing in the Pacific, 2017 may bring another dry year. Climate change may also make droughts more frequent. We need to improve wetlands management so that future droughts aren't as devastating. The new North Valley recycling project is a step in the right direction.

Fortunately, the federal agencies responsible for delivering water to wetlands have other opportunities.

First, they can complete the construction of canals to deliver water to wildlife refuges. Astonishingly, 24 years after Congress provided a guaranteed water supply to Central Valley wetlands, the Bureau still has not built facilities to deliver all of this water.

Secondly, we can increase the flexibility to transfer water among wetlands. Currently, transferring water between wetland areas is very difficult, leaving water designated for some refuges unused. Just as the Bureau allows contractors to sell water to other farmers, they should allow wetland supplies to be shared among wildlife areas.

Finally, more progress must be made in securing permanent water for wetlands. The water needed by these refuges is a tiny percentage of California's water supply – 2 percent of statewide use. Despite a congressional mandate nearly a quarter-century old, full wetland supplies have never been delivered.

With adequate water, we can meet the needs of millions of birds that migrate through our state. This spring and summer, water deliveries allowed breeding mallards to increase by 52 percent. Wetlands can bounce back when we meet their modest needs.

Now is the time to ensure that our environment is better prepared to weather the continuing drought and those yet to come.

The views expressed in this article belong to the author and do not necessarily reflect the editorial policy of Water Deeply.

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Hetch Hetchy's Mountain Tunnel to close for repairs

SF Chronicle | August 9, 2016 | Lizzie Johnson

HETCH HETCHY VALLEY — In a remote stretch of Tuolumne County, down a steep road choked with poison oak and manzanita, lies one of the most crucial pieces of Hetch Hetchy's water infrastructure.

The Mountain Tunnel runs 19 miles and connects the Kirkwood Powerhouse to the Priest Reservoir, just north of the town of Moccasin. Millions of gallons of water funnel through the granite tunnel daily en route to faucets across the Bay Area. But the tunnel — built by miners nearly a century ago — is at risk of catastrophic collapse, which would affect the more than 2.6 million residents and businesses that depend on it for water.

The San Francisco Public Utilities Commission will shut down the tunnel for an unprecedented 90 days beginning early next year, completely cutting off the Bay Area from its main water supply in the craggy heights of Yosemite National Park. Crews will inspect the tunnel and make patch repairs. The improvements will be followed by seven to eight years of construction to stabilize the water system's main artery.

"We don't think we can wait much longer to do something about it," said Steven Ritchie, assistant general manager of water enterprise at the PUC. "It's a big deal because we get 85 percent of our water from the Hetch Hetchy system. Right now, if we have a significant collapse in the tunnel, it could take six or more months to bring it back into service. We need something more reliable."

This fall, the agency is spending about \$5 million to enlarge adits, or entry points, and improve accessibility to the tunnel, including widening gravel roads that skirt down steep canyons to it. The circular shafts that lead to the tunnel are only 3 feet wide — large enough to fit a single handyman with tools. After the project, they will be 8 feet — wide enough for vehicles to pass through. It will also cut the time needed to get the tunnel back online should part of it collapse.

"To be sure we can really take care of any significant failure, we want to be able to get equipment in there," Ritchie said during a visit last week. "That will speed up what we are able to do. We're still figuring out what to do in the big picture, whether that's repairs or building a new pipe."

City officials have known for more than 25 years that the hard-to-access tunnel needed significant work. Concrete laid before the tunnel opened in 1925 is deteriorating, and the volume of water flowing through the connector unobstructed is declining, data show.

About 12 of the tunnel's 19 miles are lined with concrete and the other 7 miles were chiseled through granite. It's the lined portion that concerns engineers. Reports dating to 1989 flag a stretch of tunnel in urgent need of repairs. A collapse in the Mountain Tunnel could cost more than \$100 million to repair or \$620 million to replace, according to the PUC.

Officials considered including the connector in the PUC's \$4.6 billion water system improvement project, which is near completion. But the tunnel was ultimately left out of the rebuild, which focused on stabilizing Bay Area water facilities at risk of failing during an earthquake. The upcountry tunnel didn't pose enough of a seismic risk to be included.

“This has been many years in the making,” said PUC spokesman Charles Sheehan. “The first inspection was done in 1989. That’s when people started to realize there was work that needed to be done. Now it’s actually happening. We’re in the middle phase, and moving forward, we have to decide whether to do repairs over several seasons or just build something new.”

The agency is grappling with whether to repair the Mountain Tunnel completely, which would require shutting it down for two months every winter for up to 10 years, or to build a new tunnel parallel to the old one. The latter is the more expensive — but more reliable — option. Ritchie said the 90-day shutdown in January will help officials decide which option is best.

“We want to see if anything further has deteriorated,” he said. “Having year after year of work represents a risk we don’t want to take. With a new tunnel, you have the benefit of only having a shutdown at the end of the project. But it’s also much more expensive.”

The PUC has four to five months’ worth of water in Bay Area reservoirs at all times. Beginning in January, water will come from those stores, including Crystal Springs, San Andreas, Calaveras and San Antonio. Filtration plants on the Peninsula and in Sunol Valley also will help supply residents and businesses.

Meanwhile, crews will continue renovation work at two adits to the tunnel until the inspection begins. Last week, Bob Slater, a PUC watershed keeper, tested oxygen, carbon dioxide and explosive gas levels at one of the connector’s adits. PUC officials waited nearby to enter.

“So far we aren’t dead,” Slater said, joking.

The group walked down the tunnel through sticky mud and past gnarled chunks of granite. A bat careened out of a crevice, and the light gradually dimmed. At the end of the tunnel was a round bulkhead. Behind the cool, circular door, the weight of the Bay Area’s water supply quietly whooshed past.

Local wood lined the lip of the concrete door — an indication of work completed a century ago. Stalactites hung from the concrete, and orange mineral seepage discolored portions of the wall. Ritchie shined a flashlight at the bulkhead door. In January, after four days of draining, crews would open it for the first time in nearly 20 years and begin the inspection process and first repairs.

“What’s changed the most, that’s the most critical piece of information,” Ritchie said. “Getting in to see what’s going on is much better than worrying.”

Bob Mues, a project engineer overseeing the adit expansion, pointed out where the new door would start and end. The posse, wearing hardhats and thick-toed boots, watched.

“At some points we’ll be doing root canals,” Mues said, referring to the 90-day shutdown. “In other places, it’s just polishing. It’s amazing to think we’ll be in that tunnel where all of our water flows.”

The crew turned around and walked out of the adit, reflective vests glimmering, back into the light.

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