

**BAY AREA WATER SUPPLY AND CONSERVATION AGENCY
BOARD OF DIRECTORS MEETING**

October 6, 2017

Correspondence and media coverage of interest between Sept. 24, 2017 and September Oct. 5, 2017

Media Coverage

Water Supply Conditions:

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Article: Groundwater in Santa Clara County now back to pre-drought levels

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Article: Oroville Dam spillway update: 85 vertical feet left, with one month to go

Date: October 2, 2017
Source: Sacramento Bee
Article: In 1939, the feds made a Central Valley water deal. It may doom the Delta tunnels

Date: October 2, 2017
Source: San Francisco Chronicle
Article: California is obligated to fix delta water delivery system

Water Policy:

Date: October/November 2017
Source: Bay Area Monitor
Article: Freeing up Fish: The Effort to Remove Barriers to Spawning Sites

Date: October 4, 2017
Source: Capital Press
Article: Bill to ease water measuring regs awaits Brown's signature

Date: September 26, 2017
Source: New York Times
Article: Does the Colorado River have rights? A lawsuit seeks to declare it a person

Date: September 24, 2017
Source: Sacramento Bee
Article: Plan to pump more water from the Delta gets approved

Post-Drought:

Date: October 5, 2017
Source: Scientific American
Article: In a Body Farm of Trees, Scientists Root Out the Killers

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California's reservoirs are full, but will this winter be wet or dry?

Mercury News | October 3, 2017 | Paul Rogers

Like every autumn, October is bringing cooler weather, changing leaves and pumpkins to fields across California.

But unlike the past five years, when a historic drought gripped the state, there's something new across the landscape: full reservoirs.

From a water supply standpoint, California is heading into this winter's rainy season in much better shape than any year since 2011. San Luis Reservoir, the massive inland sea between Gilroy and Los Banos that provides key supplies for Central Valley farmers and cities from San Jose to San Diego, is 86 percent full. A year ago it was only a quarter full.

Drenching storms last winter that prompted Gov. Jerry Brown to declare an end to California's drought in April delivered enough water to raise the level by 121 feet at San Luis, which is nine miles long and the state's fifth largest reservoir.

"I'm feeling a lot better this year than in years past," said Grant Davis, director of the state Department of Water Resources in Sacramento.

Similar conditions exist around most parts of California. Los Vaqueros Reservoir, the biggest in Contra Costa County, is 94 percent full. All seven of the East Bay Municipal Utility District's reservoirs are 83 percent full. Loch Lomond, the main reservoir in Santa Cruz County, is 93 percent full. And statewide, the 45 large reservoirs that form the backbone of California's water storage are 120 percent of average for this time of year.

The 10 reservoirs operated by the Santa Clara Valley Water District are 45 percent full, largely because the district has been using them to steadily recharge its groundwater — the reason many of them were built.

All that carryover water means that even if this winter isn't particularly wet, the chances of water restrictions next summer are low.

"Our reservoirs filled. We're set up to have a couple of years worth of supply. So we're not expecting to have shortages this summer," said Andrea Pook, a spokeswoman for the East Bay Municipal Utility District, which serves 1.4 million people in Alameda and Contra Costa counties.

The question that keeps coming up again and again is: "How much will it rain this winter?"

Unfortunately, nobody knows.

Modern weather forecasting technology — with satellites, supercomputers, radar and temperature sensors spanning the globe — can only predict weather with any accuracy within a week to 10 days.

"I wish I had a crystal ball," said Charles Bell, a forecaster with the National Weather Service in Monterey.

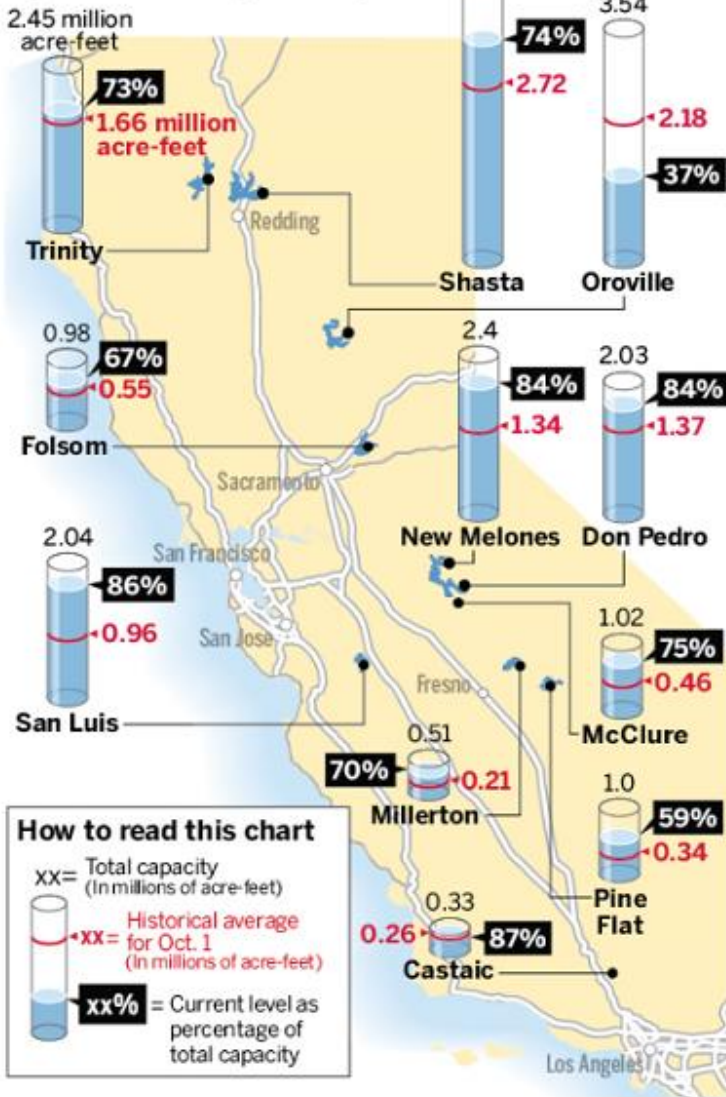
Short-term weather forecasts are markedly different than long-term climate trends.

Long-term climate patterns are easy to measure. The Earth continues to steadily warm — the 10 hottest years since 1880 all have occurred since 1998, for example, and the past three years

MAJOR RESERVOIR LEVELS

Because of the very wet "rain year," most of the big reservoirs in California are currently holding more water than their historic average for early October.

Figures as of midnight Sunday



RAINFALL FOR MAJOR CITIES

Oct. 1-Sept. 30 rainfall season



Source: California Department of Water Resources, National Weather Service

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have been the three hottest — as do the oceans. The warming water causes sea levels to continue to rise.

Computer models at NASA, NOAA, the Lawrence Berkeley National Laboratory and other scientific agencies can plug in the current rates of warming, sea level rise, carbon dioxide concentrations in the atmosphere and other factors to make general predictions about what the world will look like in 10 or 20 or 50 years if the trends continue.

If countries emit more heat-trapping gases, the global temperature goes up. If they emit fewer, it rises more slowly.

But forecasting the weather for a specific day in a specific place is much more difficult. Attempts to do so months ahead of time have regularly fallen flat. The Old Farmer's Almanac last year predicted a dry year for California. It was, of course, wrong. This year it's predicting a wet winter.

The National Oceanic and Atmospheric Administration's long-range seasonal outlook last year predicted equal chances of a wetter-than-average, drier-than-average, or average rainfall season for most of California. It was wrong. The winter was much wetter than normal. And the agency is sticking with a similarly neutral prediction for this upcoming winter.

"If you look at the last two years, they have pretty much been 180 degrees out of sync," said Jan Null, a meteorologist with Golden Gate Weather Services in Saratoga.

Null, a former forecaster with the National Weather Service, notes that forecasts are made by looking at everything from temperature patterns to barometric pressure to storm systems that form thousands of miles away in the Pacific Ocean. There are literally millions of variables, changing by the minute, so the closer a forecast is to the date desired, the more accurate it is.

Advances in technology are slowly helping.

“We’ve improved about one day per decade,” Null said. “When I started in the 1970s, we could get an accurate forecast about three days out. Now it’s seven days.”

Hydrologists measure years from Oct. 1 to Sept. 30. One thing is clear about the year that ended Saturday. In California, it was a near-perfect system of storms to end a big drought.

Some experts had said there was no way a drought as deep as California’s could end in one year — wrong again.

But a series of more than 40 soaking “atmospheric river” storms hit — and hit hard. They were spread out over many months and located mostly in the north, where the state’s biggest reservoirs were located. Eight key weather stations, from Mount Shasta to Lake Tahoe, received more rain last winter than any year since 1895, when modern recordkeeping began. And overall the state had the second-most runoff of any rain year except 1982-83, when massive El Nino storms caused widespread flooding.

The storms caused \$100 million in flood damage to San Jose homes along Coyote Creek and shattered the spillway at Oroville Dam in Butte County, the nation’s tallest dam. The spillway remains under repair, and Oroville is the only big reservoir in Northern California with significantly less water in storage now than normal — a deliberate move by state water managers to improve safety while hundreds of construction workers rush to fix the spillway by Nov. 1.

Davis said the Department of Water Resources is working hard to improve the state’s ability to forecast atmospheric river storms, also known as “Pineapple Express” storms, which could help to better prepare for flood emergencies and help water officials better manage reservoir levels. His department is spending \$19 million from the Proposition 84 water bond, approved by voters in 2006, to set up a system of more accurate radar to get a better sense of the size and scale of atmospheric rivers before they arrive.

The first new radar stations went in last month at the Santa Clara Valley Water District, where winter storms helped recharge depleted groundwater aquifers back to levels not seen since before the drought.

“On the heels of four or five years of drought, followed by the year that we just had,” Davis said, “that tells me we have to be prepared for just about anything.”

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California needs better weather prediction tools for water management

Union Democrat | October 3, 2017 | Guy McCarthy

Current weather forecasting tools are less than adequate for managing California's most vital natural resource, state water officials said Tuesday.

People at the state Department of Water Resources are now working with researchers at NASA and the Scripps Institution of Oceanography to develop new technology to better forecast moisture-laden atmospheric river storms, like the ones that hammered the Mother Lode and the rest of the Central Sierra in January and February.

Current short-term forecasting for seven days out is 70 percent accurate, while 14-day forecasts are 7 percent accurate, Grant Davis, director of the state Department of Water Resources, said Tuesday.

"That isn't adequate for water management," Davis said. "Advancing accurate, even longer-range forecasting is critical for our ability to plan for California's highly variable weather."

Atmospheric river storms are the slower-moving freight trains of moisture than can form far to the west of California out over the vast Pacific Ocean. An atmospheric river storm that originates in warmer tropical or subtropical climes is often called a "pineapple express."

'Rivers in the sky'

Administrators with DWR like Davis say they are starting the new water year intent on improving subseasonal to seasonal forecasting. Part of that aim is developing new technology for forecasting land-falling atmospheric river storms.

"The water year that ended Sept. 30 saw an extraordinary number of atmospheric rivers that created high water conditions throughout the state," Maggie Macias with DWR public affairs said Tuesday.

Record-setting precipitation in Northern California and above-average rainfall and snowfall in the Central Sierra contributed to flooding in several river systems. A total of 52 California counties declared states of emergency due to the January 2017 storm sequence.

More atmospheric river storms in February prompted emergency actions by operators of the Golden State's sixth-largest water storage facility, Don Pedro Reservoir, which used a controlled spillway in February for the first time in 20 years to draw the level down and try to avoid use of a 995-foot-long emergency spillway.

They removed a section of Bonds Flat Road before sending thousands of cubic feet per second ripping into the mainstem Tuolumne River.

Improved forecasting of atmospheric river storms can help public safety agencies and other authorities better prepare for emergencies, as well as manage the vital water that comes to the Central Sierra and the rest of the Sierra Nevada.

New technology

New technology that will help forecasters better model and forecast atmospheric river storms includes the use of wind-profiling radars like a unit installed four years ago at Bodega Marine Laboratory in Bodega Bay in Sonoma County, says Jeanine Jones, and engineer and interstate resources manager with DWR.

“Installation of wind-profiling radars provides data to understand how to model the atmospheric rivers as they reach California,” Jones said in a phone interview Tuesday.

“We are preparing computer models to be able to make experimental forecasts about atmospheric rivers later this winter,” Jones said. “Over the past decade the state of California in partnership with NOAA has spent more than \$40 million on an observing system designed to capture these atmospheric river storms.”

The Bodega Bay radar is one of the earliest pieces of the network, Jones said.

Forecasters a decade or more ago tried to work with Nexrad units, also known as Next Generation Radar, that were located on land but aimed too high to see atmospheric rivers, Jones said.

“Now that we have these new observation stations and monitoring equipment,” Jones said, “we can start seeing how to model these storms in weather models and improve forecasting.”

‘What a Difference a Year Makes’

Looking back on the water year that ended Saturday, state Department of Water Resources staff say that after five years of drought, the 2017 water year brought unexpectedly heavy precipitation, ranking second only to 1983, California’s wettest year for statewide runoff.

A recently released report says water year 2017, which started Oct. 1, 2016, and ended Sept. 30, 2017, dramatically illustrated how much California’s annual precipitation can change year-to-year.

“Virtually all of the state experienced at least average precipitation, and key Sierra Nevada watersheds were much above average,” state DWR and California Natural Resources Agency staff said.

Governor Brown lifted the proclamation of statewide drought emergency he issued in 2014, but a state-declared emergency remained in Tuolumne, Fresno, Kings and Tulare counties due to lingering drought impacts, including tapped-out or contaminated groundwater wells.

“Prior to 2017, California had experienced a decade of largely dry conditions,” the report said. “Eight of the 10 preceding water years were dry, and the water years of 2012-15 set a record for the driest consecutive four-year period of statewide precipitation.”

Present forecasting capabilities cannot provide a reliable prediction for the water year 2018, state water officials said.

High annual variability in California’s precipitation means every year could potentially bring record wet conditions like those in 2017, or a return to arid, dry conditions.

It is possible 2017 was “a wet outlier in long-term sequence of otherwise dry years, similar to the persistent dry conditions that have been experienced in the Colorado River Basin for all of the present century,” state Department of Water Resources staff said. “In the absence of reliable predictive ability, Californians must be prepared for the worst in terms of hydrologic conditions even as we hope for the best.”

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New Water Year Brings Uncertainty

Yuba Net | October 3, 2017 | California Department of Water Resources -

SACRAMENTO October 3, 2017 – After five years of drought, the 2017 water year brought unexpectedly heavy precipitation, ranking second only to 1983 as California’s wettest year for statewide runoff. The dramatic swing in water conditions highlights the need to develop better long-range weather forecasting to cope with the state’s highly variable annual precipitation.

DWR begins water year 2018 intent on narrowing the forecasting gap with improved sub-seasonal to seasonal (S2S) forecasting. Working with researchers at the National Aeronautics and Space Administration (NASA) and the Scripps Institution of Oceanography, DWR is developing innovative technology to forecast land-falling atmospheric rivers.

“Current short-term forecasting for seven days out is 70 percent accurate, while the 14-day forecast is only seven percent accurate,” said DWR Director Grant Davis. “That isn’t adequate for water management. Advancing accurate, even longer-range forecasting is critical for our ability to plan for California’s highly variable weather.”

The water year that ended September 30 saw an extraordinary number of atmospheric rivers that created high water conditions throughout the state. The Feather River watershed received record runoff in January and February, which led to some of the highest inflows into Lake Oroville ever recorded. More accurate forecasting would have helped DWR manage reservoir levels to deal with significant inflow in the days following the February 7 discovery of erosion on the main spillway at Lake Oroville. Better forecasting also would help inform the spillway’s reconstruction timeline based on predicted precipitation.

The record-setting precipitation in Northern California and above-average rainfall elsewhere contributed to flooding in several river systems. Fifty-two counties declared states of emergency due to the January storm sequence, and flood fight materials and specialists were pre-positioned in Merced, Butte, Stanislaus, Fresno, and San Joaquin counties based on the forecasts in anticipation that local agencies would request support.

Despite record-breaking rainfall in Northern California in water year 2017, drought impacts still linger. Governor Edmund Brown Jr. issued an executive order in April to end the statewide drought emergency, but maintained a state of emergency for the counties of Fresno, Kings, Tulare, and Tuolumne, where homes with dry or contaminated private wells continue to receive emergency drinking water deliveries.

One success story stemming from the drought is the East Porterville Emergency Water Project, which will see 756 unincorporated East Porterville homes connected to the City of Porterville’s municipal water supply by the end of 2017. Similar projects are underway in the communities of Okieville, Monson, and Seville-Yetterem to connect an additional 195 homes to a sustainable water supply.

Another highlight of the 2017 water year was the announcement that 99 percent of the state’s high- and medium-priority groundwater basins met a key deadline to form local Groundwater Sustainability Agencies (GSAs) under the state’s landmark Sustainable Groundwater Management Act (SGMA) of 2014. California depends on groundwater for a major portion of its

annual water supply, particularly during times of drought. The long-term planning required by SGMA will reduce the impacts of groundwater overdraft, including subsidence, and provide a buffer against drought and climate change.

Although a wet 2017 minimized the risk of subsidence in historically affected parts of the San Joaquin Valley, DWR continues to fund satellite- and aircraft-based radar monitoring of subsidence by NASA to support local implementation of SGMA.

Looking ahead, DWR is preparing for the uncertainty of water year 2018 and beyond:

- In August, the Central Valley Flood Protection Board adopted the 2017 update to the Central Valley Flood Protection Plan, prepared by DWR, which recommends long-term multi-benefit actions to improve flood risk management.
- This past year DWR awarded more than \$4.2 million in Delta Flood Emergency Response grants to improve Delta flood response and increase public safety.
- In the past five years, DWR has awarded 46 grants totaling \$25 million to develop and update flood safety plans, and increase coordination, training, and flood fight supplies for local agencies across the state.
- Ongoing SGMA implementation will bring overdrafted groundwater basins into balance to protect our water supply against the impacts of prolonged drought and climate change.
- California WaterFix will upgrade California's water supply infrastructure to more reliably transport water through the Delta, protecting against the impacts of natural disasters and climate change. The project provides a more flexible and environmentally-responsible way to convey water during significant precipitation events for use in dry years. Construction could begin in 2018, pending support from public water agencies.
- The first phase of reconstruction on the Lake Oroville spillways will be completed by November 1, 2017, ensuring the spillway can handle 100,000 cubic feet per second (cfs) this water year. Phase 2, which will be completed by end of 2018/early 2019, will bring the spillway to final design with a capacity of 270,000 cfs. The emergency spillway will be reinforced with several erosion-prevention features, including a cutoff wall to prevent head-cutting erosion.

In the face of California's highly variable weather patterns, DWR and our local, state, and federal partners are working together to ensure that Californians are prepared. Infrastructure improvements and advances in accurate, long-term forecasting are critical to public safety and sustainability. When it comes to water, California must prepare for the worst and hope for the best. Read more about water year 2017 in the report "What a Difference a Year Makes."

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A crazy water year ended Saturday. So did we set any records for rain and snow?

Modesto Bee | October 1, 2017 | John Holland

The water year that ended Saturday was the wettest on record for the watersheds feeding the Tuolumne and Stanislaus rivers. The Merced River fell just short.

The Tuolumne had about 4.86 million acre-feet of runoff from rain and snowmelt from last October through September, the Turlock Irrigation District reported. That beat the previous high of 4.64 million in 1983 and was 255 percent of the historical average, spokesman Brandon McMillan said.

The Tuolumne supplies TID, the Modesto Irrigation District and part of the San Francisco Bay Area.

The Stanislaus ended up at about 3.07 million acre-feet, topping the previous best of 2.95 million in 1983. The average is about 1.12 million acre-feet.

The Stanislaus is tapped by the Oakdale and South San Joaquin irrigation districts and the federal Central Valley Project.

The Merced watershed got about 2.48 million acre-feet over the water year, said spokesman Mike Jensen at the Merced Irrigation District. The record is about 2.83 million in 1983. The average is about 977,000.

Many water managers measure from October to the next September because it roughly matches the storm season, followed by irrigation season. Others do it from July to June.

Whatever the method, it was an epic year. It began with abundant fall storms and continued with even greater deluges in winter. The region had flooding in places, but not a massive emergency like the spillway trouble at Oroville Dam on the Feather River.

High inflow forced the opening of the spillway at Don Pedro Reservoir on the Tuolumne in February. That has happened only twice since it was completed in 1971.

It was a record year also on the northern Sierra watersheds feeding the Sacramento River.

The storms just about ended a drought that started in 2012 and affected parts of California to varying degrees. The emergency remains for scattered areas with inadequate groundwater.

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Groundwater in Santa Clara County now back to pre-drought levels

Mercury News | September 26, 2017 | Paul Rogers

Santa Clara County's groundwater — which provides nearly half the drinking water every year for 2 million Silicon Valley residents — fell by up to 60 feet during the state's recent historic drought due to heavy pumping.

But now the vast underground basins have filled back up to the levels where they were before the drought started in 2011, a welcome trend that experts say was driven by heavy winter rains and strict water conservation rules during the drought that eased the need for pumping.

Monitoring wells run by the Santa Clara Valley Water District first picked up the recovery. And now a new scientific paper published Monday further verifies it.

"People did an amazing job at conserving water during the drought. The entire aquifer recovered," said Estelle Chaussard, an assistant professor of geology at the University at Buffalo who led the study.

Chaussard analyzed data from four Italian satellites, which measured tiny changes in the surface levels of the ground in Santa Clara County during California's five-year drought. She found that as groundwater levels plummeted during 2013 and 2014, the ground itself fell as the amount of water underneath it was depleted, a phenomenon known as subsidence. From 2011 to the summer of 2014, for example, an area just north of Happy Hollow Zoo near downtown San Jose saw a 2-inch drop in the ground level, as the ground dried out like a sponge sitting in the sun.

Monitoring wells in the same area showed that the groundwater table fell by at least 60 feet during that time. Similar drops occurred in the Campbell and San Martin areas, and drops of 12 to 19 feet happened in the water table under Sunnyvale and South San Jose's Coyote Valley.

But when Gov. Jerry Brown and the Santa Clara Valley Water District moved from voluntary to mandatory conservation measures, the district limited yard watering, boosted rebates for water-efficient appliances, and hired "water cops" to leave door hangers and send letters to people watering wastefully during the hot part of the day. And significantly less water was pumped from the aquifers, which are sand and clay formations saturated with water.

At the same time, the water district continued to recharge the aquifers with some water it had in local reservoirs by moving it into dozens of percolation ponds spread throughout the county. It also used water imported from other places, such as the Semitropic Water District, where it stores groundwater near Bakersfield, to keep recharging the ground like a homeowner putting money back into the bank every month during an economic downturn.

"We were working on all fronts to reduce pumping," said Vanessa De La Piedra, groundwater management unit manager for the Santa Clara Valley Water District. "We saw the very positive results of that. Groundwater levels started to recover in 2015 even though we were still in the drought."

The ground level began to slowly rebound in 2015, Chaussard's research showed, as more water underground essentially pushed it back into place. In 2015, Santa Clara County residents reduced water use 27 percent overall from 2013 levels.

When El Niño storms finally brought normal rainfall to Northern California in the winter of 2015-16, Santa Clara County's aquifers continued to recover. And by 2017, when the wettest winter in 20 years caused downpours and floods, they were back to pre-drought levels, the district's wells showed.

The study was published in the Journal of Geophysical Research, and also includes researchers from NASA's Jet Propulsion Laboratory in Pasadena, UC Berkeley and Purdue University.

It helps demonstrate that satellite technology can be a useful tool in enabling communities to track the health of their groundwater basins, said Jay Famiglietti, a senior water scientist at NASA's Jet Propulsion Laboratory, and a professor of earth system science at the University of California, Irvine.

But the good news in Santa Clara County isn't being replicated in other parts of the state, he said. Of particular concern is the San Joaquin Valley, where farmers for years have overpumped groundwater with little or no recharging efforts, increasing pumping costs and causing roads and concrete canals to buckle and crack as the ground sinks.

"Most of the groundwater that is being pumped in the southern San Joaquin and Tulare Lake basins is much, much deeper," Famiglietti said. "Those aquifers would take decades to centuries of extremely strict management to recover significantly."

Santa Clara County has a long history of groundwater struggles. The water table fell nearly 200 feet from 1915 to 1960 as farmers and residents of growing suburbs increased their water use. Subsidence caused the ground to fall as much as 13 feet around San Jose. But when the water district began to construct local reservoirs, import water from the Delta and impose what's commonly known as "the pump tax" to fund groundwater recharge programs, the water table began to slowly recover.

It is currently back up to basically the same level it was 100 years ago, despite the fact that the county's population has grown by more than tenfold in the past century from 83,000 in 1910 to 2 million today. Even during the lowest point in the recent drought, the county's water table was still far higher than it had been in the 1960s and 1970s.

In 2014, in what may be the most important lasting legacy from California's 2011-2016 drought, state lawmakers passed a sweeping new law aimed at better regulating groundwater in California. Most other Western states, including Texas, were decades ahead of California. That law requires local government agencies in places where groundwater is most at risk to draw up plans to recover it — which could include local agencies levying fees and taxes on farmers and other users to pay for groundwater recharge projects, and potentially, for limits to be placed on how much groundwater can be removed in any year.

Critics, including some environmental groups, said that the law takes too long to take effect. As part of a compromise with farmers, it gives areas until 2040 to bring their groundwater pumping back to sustainable levels.

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Watershed conservation key to solving California's water problems

San Francisco Chronicle | September 28, 2017 | Laurie Wayburn

The California Water Fix/delta tunnels project is facing new challenges every day, most recently in regard to financing. Whether or not the state's water suppliers support the plan, an essential piece is missing from the conversation: the potential of the state's watersheds — the forests, meadows and streams that deliver water to our dams — to help solve California's water problems.

Watershed conservation is also one of the least expensive solutions to ensure greater water quantity, quality and security. This "natural infrastructure" acts as the primary water collector and filter, purifying and storing water, then releasing it at timely intervals — all while maintaining healthy conditions in our fire-prone forests. Restoring and protecting our watersheds is something that nearly every water interest in California agrees on.

Last year, the Legislature passed and the governor signed AB2480, which recognized source watersheds as key infrastructure elements under California's water system, and noted their critical role in water security. This law was the first step in creating a pathway to make focused investments in restoration and protection for natural storage. A comprehensive assessment of watershed conditions is the second, and clearly demonstrates what needs to happen to maintain water security in our state.

Five source watersheds in Northern California — the Trinity, McCloud, Feather, Pit and Upper Sacramento rivers — feed the Oroville and Shasta reservoirs, which are the core of the state's water system. These watersheds are natural storage facilities that collect, treat, store and transport drinking water to more than 28 million people, provide millions of acres of irrigation as well as 85 percent of the freshwater to the San Francisco Bay and deliver clean, renewable energy to millions of Californians.

While the state has implemented policies and systems to maintain our built water infrastructure such as dams, levees and canals and potentially, twin tunnels, there is a clear need to ensure the stability of this natural water infrastructure, which is essential for the Oroville and Shasta dams, the state's largest.

For example, the Feather and Pit rivers, principal tributaries of the Sacramento River, are major sources of the state's water. These watersheds are mostly meadows that, if restored, store water in the winter and then release cool water in the summer when we need it most. A newly released assessment by my organization, Pacific Forest Trust, shows that these and other primary-source watersheds are in significant decline and increasingly threatened by climate change, inconsistent land-management practices and other stressors that reduce watershed function.

Fortunately, this is reversible. It is well-documented that watershed restoration and conservation can increase water quality and quantity, as well as reduce peak flooding and retain water well into the summer. Natural storage is cost-effective, cheaper than new built infrastructure, and would allow more money to be spent on shoring up the aging infrastructure that is not holding up to the pressure of the extreme conditions we've experienced over the past few years.

In this era of a changing climate and extreme weather patterns, it is critical to repair and maintain our natural infrastructure if we are to build watershed resilience and mitigate the impacts of climate change. We should not count only on built infrastructure to safeguard California's supply when we have a key solution so close at hand.

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Laurie Wayburn is co-founder and president of Pacific Forest Trust.

State auditor rips Jerry Brown's \$17 billion Delta tunnels project

Mercury News | October 5, 2017 | Paul Rogers

On the eve of key votes in San Jose and Los Angeles, Gov. Jerry Brown's \$17 billion proposal to build two massive tunnels through the Delta to make it easier to move water from north to south was hit with another setback Thursday as a state audit found it was suffering from "significant cost increases and delays."

The 91-page report from California's state auditor, Elaine Howle, also said the state Department of Water Resources "has not completed either an economic or financial analysis to demonstrate the financial viability" of the project, which the Brown administration calls the California WaterFix.

Also, the Brown administration has not put in place a proper system of governance for the project, and has failed to keep important documents, the audit found.

The audit further concluded that the state Department of Water Resources "did not follow state law" when it replaced a key program manager on the project with a company that it hired without a competitive bidding process and which was run by somebody without an engineering degree.

State officials disputed that they violated the law, and said the project is on track.

"The department has already taken action based on the auditor's feedback and will take their recommendations under advisement as it moves forward with WaterFix," said Erin Mellon, a spokeswoman for the state Department of Water Resources.

Mellon said the audit "validates the unprecedented and exhaustive work the department has done to propose the best project for the state of California."

Environmental groups had a different view.

"California WaterFix is in complete disarray," said Barbara Barrigan-Parilla, executive director of Restore the Delta, a Stockton organization that opposes the tunnels. "We cannot see how any public water agency can vote to support any percentage of this project."

The audit noted that the Brown administration hired the Hallmark Group, a Sacramento consulting firm, to run a key part of the planning and oversight for the project. The company, which was recommended by Metropolitan Water District of Southern California, had managed projects at UC Merced, but had no experience managing large water projects. Its president, Chuck Gardner, has a bachelor's degree in economics. The company was given a no-bid contract that has tripled in cost from \$4 million to \$13 million.

Thursday's audit comes at a critical time for the plan, which is one of Brown's two giant legacy construction proposals, the other being his high-speed rail project.

Last month, the tunnels plan took a significant hit when the board of Westlands Water District in Fresno, the nation's largest agricultural irrigation district, voted 7-1 not to participate in its funding. Westlands had been expected to contribute roughly \$3 billion toward the cost. That

means that other water agencies — including Silicon Valley’s largest water supplier — that are trying to decide whether to help fund the project would have to pay more and raise customers’ water rates and property taxes higher than expected to cover the costs, along with any cost overruns.

On Tuesday, the board of the Metropolitan Water District of Southern California, a supporter of the project that provides water to 19 million people, is scheduled to vote on whether to help pay at least \$4 billion fund it. Thursday, Brown met personally with 17 of the district’s 38 board members in Granada Hills to urge them for a yes vote.

Then on Oct. 17, the Santa Clara Valley Water District, whose costs could range from \$600 million to \$1 billion, is set to vote. But the agency’s chairman said Thursday that it may now delay that vote.

“The audit raises questions that our board needs to evaluate,” John Varela, chairman of the Santa Clara Valley Water District.

“We represent 2 million people,” Varela said. “We want to be certain that what we do as a board is not going to have a major financial impact on our ratepayers. We want to be fair to them. That is our biggest concern.”

The Santa Clara Valley Water District, which is based in San Jose, is the wholesale water provider for a dozen agencies, including cities like Santa Clara and private companies like San Jose Water Company. The district is also considering plans to build a new reservoir near Pacheco Pass, expand the use of recycled water, form a partnership with other agencies to expand Los Vaqueros Reservoir in Contra Costa County and continue to expand its conservation efforts.

“We have to look at all of our options moving forward to provide an adequate water supply as our county continues to grow,” Varela said.

Other big Bay Area water districts, like East Bay Municipal Utility District and the Contra Costa Water District, are not part of the project.

The Delta tunnels plan, begun under former Gov. Arnold Schwarzenegger, would build two tunnels, each 35 miles long and 40 feet high, under the Delta, the vast system of channels and sloughs between the Bay Area and Sacramento where the state’s two largest rivers, the Sacramento and the San Joaquin, meet.

In 2009, the Department of Water Resources announced the project would cost \$140 million to plan, design and permit. So far, it has cost twice that, \$280 million, Thursday’s audit reported. That cost has come from water districts around the state, and the federal Bureau of Reclamation.

The idea is that the tunnels would take water from the Sacramento River, south of Sacramento near the town of Courtland, and move it to the huge pumps near Tracy that are part of the State Water Project and Central Valley Project. That, supporters say, would reduce reliance on the

pumps and make water deliveries more reliable by protecting endangered salmon, smelt and other fish, which can be killed by the pumps. Protecting the fish leads to reduced pumping.

But critics call the tunnels a huge boondoggle that will eventually allow large agribusiness interests in the San Joaquin Valley, as well as urban users in Los Angeles, to take more water out of the Delta, regardless of what promises are made now.

Complicating Brown's plans, his administration has not been able to guarantee that the tunnels will allow any more water to be pumped out of the Delta than is being pumped out now — roughly 50 percent of all its fresh water in most years.

Farm districts and city water agencies have looked at the costs and dozens of lawsuits already filed against the project, and calculated how much debt they would incur. Some wonder if they can spend the money more efficiently, or support a smaller project, even as they face increasing pressure from Brown and his staff to approve the plan as the governor's final 15 months in office wind down.

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City Desal Plant Still Not Fully Operational

Santa Barbara Independent | October 5, 2017 | Nick Welsh

Although the City of Santa Barbara's revamped desalination plant started production in May, enough bugs in the system remain four months later to say the plant is not yet officially up and operating. According to city water czar Joshua Haggmark, the plant's intake pipe has had a leak that he and the contractors recently rectified and resolved. Haggmark reported city water customers hit conservation marks of 45 percent for the month of August. Even though Santa Barbara's population increased by 5,000 since the last major drought — 1987 to 1992 — he said city customers are using even less water today than they were back then, roughly 9,000 acre-feet a year.

Given the exaggerated sense of optimism the appearance of Lake Cachuma might now engender, that's probably good. On paper, the South Coast's main reservoir is now 42 percent full. But as a practical matter in terms of available water supply, it's closer to 30 percent full. That's because water agencies downstream from the dam are now emptying the reservoir of up to 16,000 acre-feet of water to ensure groundwater basin recharge for the city of Lompoc and other nearby communities. Another 12,000 acre-feet — known as the "dead pool" — are off-limits as a failsafe way to maintain the functional integrity of the reservoir as a lake.

Haggmark has been quick to stress that Santa Barbara escaped its most intense drought ever thanks to the largesse of just one especially wet rain event. Without additional rains, he's noted, the past could quickly become prologue. Weather forecasters are now predicting there's an equal chance this winter will be wet, dry, or normal. Adding a major element of suspense to the equation is the large amount of acreage that burned during this past year's Whittier Fire on the south slopes feeding into Lake Cachuma. In heavy rains, that untethered soil could easily wash into the reservoir, creating water quality challenges while reducing the dam's ultimate water storage capacity.

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Editor's Note: This story was updated to reflect that the leaking intake pipe had been fixed.

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We're through negotiating with the state

Merced Sun Star | October 4, 2017 | Dave Long and Scott Koehn

Merced Irrigation District and our community have a strong track record of environmental stewardship. From MID staff, to our community, to our local legislators our community has put its best foot forward toward solving complex water and environmental issues related to the Merced River.

After years of promoting compromises on Merced River fishery and flow requirements, it has become apparent there is no compromise to be found.

We commend MID staff for developing and promoting the Merced River SAFE (Salmon, Agriculture, Flows and Environment) Plan as an alternative to the state's severely flawed Bay Delta Plan and the Substitute Environmental Draft that would implement part of it on the Merced.

The SAFE Plan is a comprehensive plan and solution for Merced River salmon. Merced ID, along with other parties, have been discussing a settlement as it relates to future San Joaquin River tributary river flows, including the Merced, Tuolumne and Stanislaus rivers, to the Bay Delta. We have seen zero evidence the state or environmental groups are receptive to the MID's SAFE Plan proposal.

If the state were receptive to the SAFE Plan, Merced River salmon would see improvements in their life-cycle habitat immediately through river restoration and immediate increases in river flows.

The fact the state has not embraced the SAFE Plan – and stubbornly continues to pursue its own flawed plan of taking vast amounts of water from senior rights holders – shows this is not about salmon. This is about something far greater.

This is about circumventing the water rights priority system in California and taking our senior storage and water rights to give to junior water rights holders in the name of fish and Delta outflow.

Coincidentally, the state is pursuing its twin tunnels proposal to divert more water from the Sacramento River before that water ever reaches the delta – all the while telling San Joaquin River senior water rights holders the state needs our water for the "Delta."

Forgive the pun, but something "smells fishy."

We hear echoes of "Save The Delta," "Restore The Delta," etc. Folks, we have news for you – the natural, historical Delta no longer exists.

The Delta is a forever-altered, man-made and developed water system. What was once a natural environmental system is now farms, cities and towns protected by man-made levees all built with the blessings of the state. The state allowed the Delta to be developed for agriculture, towns and cities. Given those facts, why are Merced ID's water rights being targeted as the solution to mitigate for the development of the Delta?

We know that some amount of river flow will be part of a solution for improved native fish populations. However, the Merced River is only 3 percent of the Delta inflow, yet we are being told our water is 100 percent of the solution. The main stem of the San Joaquin River, located upstream of the Merced River confluence, yields nearly twice the flow of the Merced River. And still this vital section of river has been left out of the SED's call for more water flows to the Delta.

Merced ID is willing to be part of the solution for Merced River salmon moving forward. We will not, however, stand idly by while the state looks only to our water rights as the way to mitigate the actions of others, including those who have directly benefitted from the development of the Delta.

Merced ID has tried to do the right thing by developing the SAFE Plan and making settlement efforts. We now urge Merced ID's stakeholders to support our refocused efforts as we gear up for the impending regulatory and legal battles that await as we continue to work to protect our community's water supply.

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Dave Long is president and Scott Koehn is vice president of Merced Irrigation District. They wrote this for The Merced

Jerry Brown's Delta Tunnels in Trouble Over Tripling Water Rates and Fed Probe

Breitbart | October 4, 2017 | Chris Street

Gov. Jerry Brown's \$17 billion California Delta WaterFix tunnels are in trouble over a threat to triple water costs and a federal probe of \$84.8 million in illegal payments.

The board of the Fresno-based Westlands Water District, America's largest water supplier, voted 7 to 1 on September 19 to pull out their \$4.5 billion, 26 percent participation in the \$17 billion WaterFix, which planned to build two 40-foot wide tunnels stretching for 35 miles to protect fish and divert water from the Sacramento River to the California aqueducts that service the San Joaquin Valley farmers and Southern California cities.

The move followed a July 17 presentation by Goldman Sachs to the Westlands Water District titled, "California WaterFix Financing Strategies." Goldman apparently estimated that to finance the project, the average cost of water exports from the Delta could rise by \$260 per acre foot by 2033. That is two to three times the price paid to the Bureau of Reclamation this year.

The U.S. Department of Interior Inspector General also issued an audit that found that during the Obama administration, federal Bureau of Reclamation financial assistance agreements with the State of California's Bay Delta Conservation Plan (BDCP) did not "fully disclose to Congress and other stakeholders the \$84.8 million cost of its participation in the BDCP efforts, including its subsidizing of the Federal Central Valley Project (CVP) water contractors' share of BDCP costs."

The Inspector General also found the Bureau of Reclamation was never reimbursed for \$50 million of advanced payments and improperly paid \$34.8 million of the contractors' costs through June 30, 2016. The IG stated that the Bureau of Reclamation submitted "inaccurate annual Calfed Bay-Delta certified financial reports" and "the actions it took to fund BDCP planning costs were neither transparent nor consistent with the 'beneficiaries pay' principle underlying Reclamation Law."

The IG referred the matter to the "Assistant Secretary for Policy, Management and Budget for resolution," a step that may lead to a U.S. Justice Department civil or criminal referral.

The Associated Press obtained documents on September 18 that reveal that the legal language governing California's biggest water project in half a century has been tweaked so that the tunnels are now just an "update," rather than a new project. That way every one of the 29 water districts that receive water from the existing California State Water Project will be jointly responsible to pay for the tunnels.

A Harris Farms' Executive Vice President and Westlands board member told AP that there is no guarantee that the project will consistently increase future water supplies and that "obligating hundreds of family farms" to pay for the tunnels doesn't make economic sense.

The Los Angeles Metropolitan Water District will vote on continuing as a \$4 billion WaterFix investor, and the Santa Clara Valley Water District will also vote on its \$2 billion participation. It is estimated that the project will cost residential water users about \$3 to \$4 a month. But that assumes an on-time completion, and that the project performs as advertised.

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Oroville Dam spillway update: 85 vertical feet left, with one month to go

ChicoER News | October 4, 2017 | Kelly Grow

Oroville – The wide-open middle section of the Oroville Dam spillway is 70 percent filled, with the deadline for this season’s work fast approaching.

The contractor Kiewit Infrastructure West Co. remains on track to have the 3,000-foot spillway ready to pass flows of 100,000 cubic-feet per second by Nov. 1, said Jeanne Kuttel, chief of engineering for the state Department of Water Resources, in a media call on Wednesday morning.

Jeff Petersen, project director for Kiewit, said 230,000 cubic yards of roller-compacted concrete — the material going into the 1,050-foot middle chute this season — had been poured. There are 85 vertical feet to go, Petersen said.

Construction continues around the clock, with 600 employees working double shifts. Employees have worked 553,000 combined hours since work started in May without any recordable injuries, he said.

What should be done by Nov. 1

The 350-foot lower section of the spillway and 870 feet of the upper spillway are being filled with leveling concrete as a foundation and covered with structural concrete. This should be the final work for those two areas.

The lower and upper chutes are about 60 percent complete, said Erin Mellon, the department’s assistant director of public affairs via email.

Kiewit crews are still working on the deeply eroded middle section of the spillway, which is being filled with roller-compacted concrete this season.

The top 730 feet of the spillway are being patched. See a diagram of the spillway construction areas [here](#).

Transmission lines have been rerouted so none run across the main or emergency spillways.

All of the exposed bedrock on the spillway has been cleaned and prepared for concrete placement.

“(Cleaning) is a tedious but important process,” the project director said.

To be completed in 2018

Structural concrete will be added to the middle and lower chutes next year.

For the emergency spillway, the concrete splash pad and secant cut off wall, which goes 35-65 feet underground to bedrock, should be completed by December or January, DWR officials said. These are measures to prevent the dangerous erosion that occurred earlier this year, when the emergency spillway was used for the first time in history.

More updates

The independent Board of Consultants had its 12th meeting with DWR officials last week and the latest memo should be out soon, Mellon said. Later in the month, DWR will submit a flood control operations plan for state and federal review.

She also announced that plans for a year-round boat ramp at the Loafer Creek Recreation Area were approved by the Federal Energy Regulatory Commission. It should be accessible with lake levels as low as 700 feet.

DWR does not plan to use the spillway this year and officials are still deciding whether or not to open the spillway boat launch ramp again in the future, she said in response to reporters' questions.

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In 1939, the feds made a Central Valley water deal. It may doom the Delta tunnels.

Sacramento Bee | October 2, 2017 | Dale Kasler and Ryan Sabalow

Dam builders from President Franklin Roosevelt's administration wanted to bring water to the parched eastern half of the San Joaquin Valley, but first they had to deal with a cluster of landowners whose ancestors had been there since the 1800s.

The deal they cut in 1939 paved the way for much of the Central Valley Project, an engineering marvel that helped turn the Valley into one of the world's most productive farming regions.

It has also formed the basis, nearly 80 years later, of a major funding impasse that threatens to unravel California WaterFix – Gov. Jerry Brown's plan to build a pair of tunnels beneath the Sacramento-San Joaquin Delta to modernize the aging water delivery system begun during Roosevelt's New Deal.

The issue came to a head when the board of Westlands Water District, the largest of all the water agencies served by the Central Valley Project, voted Sept. 19 against paying for its share of the expected \$17.1 billion cost of the tunnels.

The vote by Westlands, which represents hundreds of farmers in Fresno and Kings counties, left a multibillion-dollar hole in the construction budget for WaterFix, which is designed to improve water deliveries to farms and cities south of the Delta. WaterFix advocates have since floated the idea of a scaled-back, less-expensive version of the tunnels.

Westlands' decision was rooted in a cost-allocation formula imposed by the U.S. Bureau of Reclamation – a formula that has its origins in the 1939 deal and serves as a reminder of the convoluted nature of water distribution in California.

"This just comes with the territory to some degree," said Jay Lund, director of UC Davis' Center for Watershed Sciences.

In a nutshell, Reclamation's formula effectively exempts a large group of water users who get their supplies from Friant Dam, the facility made possible by the Roosevelt-era agreement, from having to help pay for the Delta tunnels. This group includes the city of Fresno and a string of farm-irrigation districts stretching 150 miles south.

For Westlands and many other Central Valley Project customers, Reclamation's system inflates their costs for participating in WaterFix by several billion dollars. Westlands said farmers' water costs could quadruple, to more than \$600 an acre-foot, if the district jumped into the project.

"I don't know that we can afford those numbers," said Westlands director Todd Neves, a tomato and almond grower, as he prepared to cast his "no" vote. So far, not a single CVP contractor has committed to paying for WaterFix.

Reclamation operates its Central Valley Project alongside the State Water Project; both pump water out of the Delta to a variety of cities and farm districts in the San Joaquin Valley, Bay Area and Southern California. Brown's administration says the tunnels would improve the Delta's crumbling ecosystem while enabling the pumps to operate more reliably, increasing water deliveries to the two projects' customers.

The idea has been that south-of-Delta water districts would pay for the tunnels, in amounts that correspond to the volume of water they get. Brown's Department of Water Resources has said all State Water Project customers south of the Delta must pay, or find another state contractor to take their share.

For federal contractors, the Bureau of Reclamation has taken a different approach – to Westlands' frustration. Although Reclamation has contributed millions to the planning process, the bureau says that because WaterFix hasn't been authorized by Congress, it lacks legal standing to compel all of its south-of-Delta contractors to contribute. Participation is voluntary.

What's more, Reclamation signaled to a major group of customers – the districts getting water out of Friant Dam – that their supplies are probably secure enough that they don't need the tunnels.

With that assurance in mind, the Friant districts have said they're probably willing to contribute only a small sum to WaterFix's budget but not nearly a "full" share. Friant customers get at least 800,000 acre-feet of water a year from the Central Valley Project, enough to nearly fill Folsom Lake to capacity, making them one of the largest customers of the Central Valley Project.

The funding dilemma can be traced directly to the 1939 agreement.

Two years after Congress authorized construction of the Central Valley Project, officials at Reclamation faced a problem. They wanted to build a dam on the San Joaquin River at Friant, just outside of Fresno, to deliver water to the east side of the valley. But they couldn't build Friant without first making peace with a group of downstream landowners descended from legendary California cattleman and land baron Henry Miller. These landowners had been farming along the San Joaquin since the 1800s, had some of the most ironclad water rights in the state and weren't eager to let Reclamation dam their river.

"There's a property right in water. Those users have to be negotiated with," said Jennifer Harder, a water-law expert at the University of the Pacific's McGeorge School of Law.

A deal was signed July 27, 1939. Under the "Contract for the Exchange of Waters," the landowners allowed the government to dam the river at Friant, creating the eastern branch of the Central Valley Project.

In return, the landowners, known as Exchange Contractors, were guaranteed 840,000 acre-feet of water a year, pumped out of the Delta from the Sacramento Valley. To this day, their water costs are shouldered by the Friant water districts.

The Exchange Contractors make no apologies for their special stature, noting that similar arrangements were made with senior water-rights holders in the Sacramento Valley to permit the construction of Shasta and Oroville dams.

"It's just the reality of the way the system was set up," said Cannon Michael, an Exchange Contractor in the Los Banos area and the great-great-great grandson of Henry Miller. "It was set up a long time ago and it's the way California water law came into play.... People accept the water rights system for what it is."

The water rights system, though, has left the tunnels project with one less major group of customers to pay for it.

Not the Exchange Contractors – no one is arguing that these farmers, who’ve never had to pay for their Central Valley Project water, should now have to pitch in for the tunnels.

The Friant customers are another story.

For one thing, they’ve always paid their share of costs for the Central Valley Project, including the cost of water that’s shipped from the Delta to the Exchange Contractors.

For another, even though they don’t get water from the Delta – it all comes from the San Joaquin River, by way of Friant Dam – the Friant group depends on the Delta to operate smoothly. Why? Because if the Exchange Contractors don’t get their full allotment from the Delta, they have the right to pull water away from the Friant districts. It’s happened twice, during the drought years of 2014 and 2015.

Tom Birmingham, general manager at Westlands, said Friant’s unusual status in the Central Valley Project should compel the Friant districts to pay for a full share of the Delta tunnels.

“That’s consistent with Reclamation’s historic practice,” Birmingham said.

Friant water users see it differently. True, their supplies get jeopardized if the Exchange Contractors get shorted. But they’ve been told by Reclamation that the tunnels probably aren’t needed to make sure the Exchange Contractors get all they’ve been promised. So they’re looking at making a modest investment in the tunnels, as a kind of insurance policy to ensure that the Delta pumps can operate more reliably.

“We have an interest in making sure that things get better in the Delta,” said Jason Phillips, chief executive of the Friant Water Authority. Friant’s board of directors issued a statement Thursday saying “we are generally supportive” of WaterFix.

But Phillips said Friant’s member agencies aren’t willing to pay at anywhere near the level Westlands is suggesting.

“We’re probably in the single digits of the percentage of the project,” Phillips said.

For now, Friant officials aren’t in a rush to commit to WaterFix. In its statement of support for the tunnels, the Friant board said it’s premature to say how much it will invest.

“Until we have certain key questions answered and are able to obtain a fuller grasp of how are member agencies could potential benefit, (Friant) is unable to make any additional determinations at this time,” the board said.

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California is obligated to fix delta water delivery system

San Francisco Chronicle | October 2, 2017 | John Laird

The Bay Area imports most of its water and relies on the Sacramento-San Joaquin River Delta and its tributaries for about 70 percent of its supply. Those supplies face an uncertain future as a changing climate shrinks the Sierra snowpack and raises sea levels, and a declining ecosystem results in further restrictions — all while the Bay Area's population and economy continue to grow.

The stark reality is that 25 million people and 3 million acres of farmland are at risk of losing up to 20 percent of their future water supplies if the status quo continues in the delta.

And though voters backed a portfolio of water alternatives in the 2014 water bond — including more conservation, storage and water recycling — and California adopted a new process to get to sustainable groundwater management, these actions are not enough to stabilize the system, address ecosystem woes and meet future needs.

We must have action in the delta. California WaterFix, which would construct new intakes in the northern delta and move water through tunnels to reduce conflicts with endangered species habitats, is the state's science-driven proposal to upgrade our aging water system and protect water supply reliability. Engineers, scientists, water experts and business groups have voiced their support.

Without the WaterFix upgrade, it's clear that water supplies will steeply decline over time, with the loss of up to 1 million acre-feet a year or nearly 20 percent of what is delivered today.

WaterFix is not about extracting more water from the delta. It's about avoiding further declines in a supply that millions of Bay Area residents and others in the state have invested in for decades. We need increased investments in conservation, recycling and other supplies, but must also modernize our existing water delivery system. In fact, some strategies such as conservation and recycling can't work in the future without the reliable water WaterFix will provide.

A companion state initiative known as California EcoRestore will enhance 30,000 acres of habitat in the delta. Add to that the Brown administration's ongoing effort to secure voluntary, collaborative agreements to improve flows and habitat in the delta and the Sacramento and San Joaquin river watersheds, plus significant dollars in a bond measure headed for the 2018 ballot, and these actions together represent our best, most comprehensive approach to protecting the delta ecosystem.

After 10 years of review, tens of thousands of pages of environmental analyses, extensive modeling and public comment, it is now up to local public water agencies to define their level of participation in WaterFix over the coming weeks.

Though Westlands Water District has decided not to participate in WaterFix under current financing scenarios, Zone 7 Water Agency in eastern Alameda County has voted to come in. Others will as well. If necessary, the project could be scaled to the needs of agencies that decide to participate.

The state is not going to walk away from advancing a solution. We have an obligation to pursue this upgrade. To do nothing would be irresponsible. It's time to move forward with WaterFix.

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John Laird is the California Natural Resources Secretary.

Freeing up Fish: The Effort to Remove Barriers to Spawning Sites

Bay Area Monitor | October/November 2017 | Robin Meadows

As a child growing up in the East Bay, Jeff Miller loved seeing salmon in Lagunitas Creek when he visited Point Reyes. “I was inspired to restore migratory fish in the Bay Area,” he recalled. Miller ultimately chose Alameda Creek, which is the biggest local tributary to the San Francisco Bay and once had both salmon and steelhead trout.

Collectively known as salmonids, salmon and steelhead are born in freshwater, spend much of their lives in the ocean, and then return to freshwater to spawn. Because they depend on marine as well as inland environments, healthy populations of salmonids reflect healthy coastal ecosystems.

Moreover, these migratory fish also benefit coastal inland environments, where nutrients can be relatively scarce. Salmonids grow up in the nutrient-rich sea and, when they swim back up coastal waterways, transfer nitrogen and phosphorous inland in the form of their bodies. Salmonids feed eagles, river otters, and other predators, and also fertilize plants growing along streams.

When Bay Area steelhead were listed as threatened under the federal Endangered Species Act in 1997, Miller suddenly had a lot of help realizing his dream of restoring migratory fish in the Bay Area. “It was the catalyst to restoring Alameda Creek,” said Miller, executive director of the Alameda Creek Alliance, a Fremont-based nonprofit dedicated to bringing salmon and steelhead trout back to Alameda Creek.

Since then, local, state, and federal agencies and organizations have collaborated on restoring steelhead in Alameda Creek. And now, 20 years later, the creek’s biggest barrier to fish migration — a massive flood control structure in Fremont called the BART weir — is finally poised to be retrofitted with a fish ladder.

Historically, steelhead flourished in many creeks that flow into the Bay. But over the last 150 years, people built dams, stream crossings for roads and utilities, and other barriers that keep fish from migrating upstream. A 2004 State Coastal Conservancy (SCC) report identified 172 manmade barriers to fish in the Bay Area; Alameda Creek’s watershed, which includes the creek as well as all the streams that flow into it, had the most by far at 96.

“A lot of the infrastructure was built in a world when there was no regard for wildlife, but there’s no reason you can’t have both,” said Michael Bowen, an SCC project manager and chair of the California Fish Passage Forum, an association of public, private, and government organizations dedicated to removing barriers to fish migration in California. Fish-friendly designs are readily available these days, he added, and the National Oceanic and Atmospheric Administration has engineers who are “delighted to advise municipalities” on how to incorporate fish passages.

A number of fish passage projects are in place or under way in the Bay Area, and many local creeks have the potential to help rebuild steelhead along the Central Coast. That said, Alameda Creek has the largest watershed in the Bay Area — and the bigger the watershed, the greater the chances of restoring steelhead. And those chances look good. Compared to salmon, which

typically return to their natal streams to spawn, steelhead are much more flexible. “If one stream doesn’t work, they’ll just try another,” Bowen said.

Alameda Creek used to have so many steelhead that the population was self-sustaining. But a decade ago, it was down to a single spawning pair called Bonnie and Clyde. “There were so few we were literally naming fish,” recalled Joshua Fuller of the National Marine Fisheries Service, which is charged with restoring federally endangered marine species.

Even today, the Alameda watershed still has a scattering of steelhead. Some are captured below barriers and transported upstream by biologists; others are landlocked behind the dam in Calaveras Reservoir, which is in the hills east of Fremont and stores water for San Francisco. Another cause for optimism is that while the lower stretch of Alameda Creek is urban and channelized, the upper reaches still offer what steelhead need: gravel to spawn in, riparian canopy that shades the water and keeps it from getting too hot, and deep pools to live in when stream flow is low and temperatures are high. “There’s some amazing habitat left,” Fuller said.

The combination of remnant fish and suitable habitat boosts the likelihood of restoring steelhead. For that to happen, though, the fish need to be able to get into Alameda Creek in the first place — something they haven’t been able to do since 1972, when the BART weir was built to protect the train tracks’ creek crossing. “The BART weir is the main barrier to adult steelhead returning to spawn,” said the Alameda Creek Alliance’s Miller.

Steelhead are prodigious leapers, jumping several times their body length of roughly two feet. But the fish are no match for the BART weir. “It’s a sloping cement apron and has a 12-foot drop,” Miller said. Videos show steelhead struggling to ascend the weir, only to fall back into the water below it. And just upstream of the BART weir lies another hurdle in the steelheads’ obstacle course: a pair of rubber dams that divert water from Alameda Creek for the Alameda County Water District.

About 15 fish passage projects have been built in the Alameda Creek watershed so far, Miller said, and projects for the BART weir and rubber dams are almost ready to go. The funding is in place — \$1,000,000 each from the National Fish and Wildlife Foundation and from the California Department of Fish and Wildlife — and construction is scheduled to start next year.

“It will reopen the entire watershed for the first time in almost 50 years,” Miller said, adding, “Once those fish ladders go in and fish can make it to Sunol Regional Wilderness, it’s going to be a game-changer.”

His work isn’t done yet, though. The lower stretch of Alameda Creek is a 12-mile flood control channel and is about as far from natural as possible. “It’s a gauntlet for small fish,” Miller said. As young steelhead make their way to the sea, the wide, shallow channel exposes them to predators. “Birds and invasive fish like bass are waiting to pick them off,” he explained.

And young steelhead that do make it past this gauntlet face yet another challenge when they reach the Bay. “They need a place to grow big before going out to the ocean to avoid predation,” Miller said. He hopes that the salt pond restoration at Eden Landing, which is near the mouth of Alameda Creek, will help give young steelhead this transitional habitat.

Projects to restore steelhead will also benefit salmon. “Chinook will do really well,” Miller predicted, adding that because salmon are so big, they’re likely to be more noticeable than steelhead.

Bringing migratory fish back into city-dwellers’ lives also motivates the National Marine Fisheries Service’s Fuller, who, like Miller, was inspired to work with migratory fish after seeing them in streams as a youth. “They’re the essence of wild, spending part of their lives in the ocean,” said Fuller, adding, “Hopefully we can bring them back for future generations.”

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Bill to ease water measuring regs awaits Brown's signature

A bill that would enable landowners to install their own water measuring devices if they've taken a course from the University of California Cooperative Extension passed unanimously in both houses of the Legislature.

Capital Press | October 4, 2017 | Tim Hearnden

SACRAMENTO — A bill that could save money for rural ranchers who divert water by easing a state regulation is awaiting Gov. Jerry Brown's signature.

The California Cattlemen's Association-backed legislation by Assemblyman Frank Bigelow, R-O'Neals, would change a State Water Resources Control Board rule that those who divert more than 10 acre-feet of water per year hire a licensed engineer to install a water-measuring device.

Assembly Bill 589 would allow diverters to instead install their own devices or implement their own measurement method if they take a course from the University of California Cooperative Extension, CCA officials explain.

"We've been working with the Cooperative Extension folks in terms of getting the word out on this legislation," said Kirk Wilbur, the CCA's director of legislative affairs. He said the bill would be "one piece of relief" for ranchers.

"A lot of work needs to be done moving forward to lessen the financial impacts of regulations on ranchers," he said.

The governor has until Oct. 15 to sign or veto the bill, which passed unanimously in both legislative chambers. While the UC typically doesn't take positions on legislation, it supported this bill, said Larry Forero, a UCCE adviser based in Redding.

Forero believes the course would be helpful to ranchers. He said a two-day UCCE irrigation course in Northeastern California filled so quickly that organizers scheduled additional dates for the course.

"You can really talk about ideas and talk about concepts, and observationally I think I've seen changes on the ground just from what we've done," Forero said.

"I think education goes a lot further than regulation on some of this stuff," he said.

The legislation comes after the state's water board in 2016 ramped up reporting requirements for California's roughly 12,000 landowners and users who have rights to divert water from nearby streams.

The regulations require annual reporting of water diversions rather than reporting once every three years, as previous law required of senior right holders. Those who divert more than 10 acre-feet of water per year must also measure their diversions.

The rules cover all surface water diversions, including those under pre-1914 and riparian water rights. State officials said their aim was to provide more accurate and timeline information on water use in California.

The reporting rule was phased in, with large diverters with a claimed right to take 1,000 acre-feet of water or more per year required to have a measuring device in place by Jan. 1, 2017.

Those with rights for 100 acre-feet or more had until July 1 to install devices, and those with rights to divert 10 acre-feet must comply by Jan. 1, 2018.

If Brown signs the bill, the UC will work with the water board in determining the information that will be provided in the course, Forero said.

In a related matter, the CCA and other agriculture advocates recently persuaded the water board to hold off on increasing registration fees for certain small-scale water uses, including livestock stock ponds and irrigation.

Under the current fee structure, registration holders pay an initial \$250 and a renewal fee of \$100 every five years. Under the proposed increase, the initial fees would have risen to \$500 for stock ponds and \$750 for irrigation, and annual fees would have ranged from \$100 to \$150, the CCA explained.

Wilbur said the increase would have severely impacted diverters with numerous stock ponds, for which the annual fee could exceed the value of the water held in the ponds.

Board employees will work with the CCA and other farm groups to come up with a new proposed fee structure, which the board will likely consider in 2018.

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Does the Colorado River have rights? A lawsuit seeks to declare it a person

New York Times | September 26, 2017 | Julie Turkewitz

DENVER — Does a river — or a plant, or a forest — have rights?

This is the essential question in what attorneys are calling a first-of-its-kind federal lawsuit, in which a Denver lawyer and a far-left environmental group are asking a judge to recognize the Colorado River as a person.

If successful, it could upend environmental law, possibly allowing the redwood forests, the Rocky Mountains or the deserts of Nevada to sue individuals, corporations and governments over resource pollution or depletion. Future lawsuits in its mold might seek to block pipelines, golf courses or housing developments and force everyone from agriculture executives to mayors to rethink how they treat the environment.

Several environmental law experts said the suit had a slim chance at best. “I don’t think it’s laughable,” said Reed Benson, chairman of the environmental law program at The University of New Mexico. “But I think it’s a long shot in more ways than one.”

The suit was filed Monday in U.S. District Court in Colorado by Jason Flores-Williams, a former Santa Fe lawyer now in Denver. It names the river ecosystem as the plaintiff — citing no specific physical boundaries — and seeks to hold the state of Colorado and Gov. John Hickenlooper liable for violating the river’s “right to exist, flourish, regenerate, be restored, and naturally evolve.”

Because the river cannot appear in court, a group called Deep Green Resistance is filing the suit as an ally, or so-called next friend, of the waterway.

If a corporation has rights, the authors argue, so, too, should an ancient waterway that has sustained human life for as long as it has existed in the Western United States. The lawsuit claims the state violated the river’s right to flourish by polluting and draining it and threatening endangered species. The claim cites several nations whose courts or governments have recognized some rights for natural entities.

The lawsuit drew immediate criticism from conservative lawmakers, who called it ridiculous. “I think we can all agree rivers and trees are not people,” said Sen. Steve Daines, R-Mont. “Radical obstructionists who contort common sense with this sort of nonsense undercut credible conservationists.”

The office of Hickenlooper, a Democrat, declined to comment.

The lawsuit comes as hurricanes and wildfires in recent weeks have left communities across the country devastated, intensifying the debate over how humans should treat the earth in the face of global climate change.

Flores-Williams characterized the suit as an attempt to level the playing field as rivers and forests battle human exploitation. As it stands, he said, “the ultimate disparity exists between entities that are using nature and nature itself.”

Imbuing rivers with the right to sue, he argued, would force humans to take care of the water and trees they need to survive — or face penalties. “It’s not pie in the sky,” he said of the lawsuit. “It’s pragmatic.”

Jody Freeman, director of Harvard’s environmental law program, said Flores-Williams would face an uphill battle.

“Courts have wrestled with the idea of granting animals standing,” she wrote in an email. “It would be an even further stretch to confer standing directly on rivers, mountains and forests.”

The Colorado River cuts through or along seven Western states and supplies water to approximately 36 million people in those states, including New Mexico. It also feeds millions of acres of farmland.

It is as famous for its power and beauty as it is for overuse. Scientists expect that increased temperatures brought on by climate change will cause it to shrink further, leaving many people anxious about its future.

Flores-Williams is a criminal defense lawyer known for suing the city of Denver over its treatment of homeless people. Deep Green Resistance believes that the mainstream environmental movement has been ineffective, and that industrial civilization is fundamentally destructive to life on earth. The group’s task, according to its website, is to create “a resistance movement that will dismantle industrial civilization by any means necessary.”

Flores-Williams responded to criticism that his argument, if successful, would allow pebbles to sue the people who step on them.

“Does every pebble in the world now have standing?” he said. “Absolutely not, that’s ridiculous.”

“We’re not interested in preserving pebbles,” he added. “We’re interested in preserving the dynamic systems that exist in the ecosystem upon which we depend.”

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Plan to pump more water from the Delta gets approved

Sacramento Bee | September 27, 2017 | Ryan Sabalow

Federal fisheries regulators have approved a controversial plan opposed by environmental groups that would allow for more pumping from the Sacramento-San Joaquin Delta this fall.

On Wednesday, the U.S. Fish and Wildlife Service signed off on a proposal championed by the U.S. Bureau of Reclamation and south state California water interests to ramp up Delta pumping starting next week.

“We believe this modification will help strike a balance between this year’s water needs for wildlife, agriculture and municipalities,” Paul Souza, the wildlife services regional director in Sacramento, said in a prepared statement.

The contractors’ proposal would allow for an additional 400,000 acre-feet – around 130 billion gallons – of water to be shipped through the Delta to farms and cities in the Silicon Valley, Southern California and the San Joaquin Valley. Otherwise, that water would flow on a natural course to the Pacific Ocean.

Environmental groups fought the plan, saying requirements federal scientists use to set pumping rates dictate more water go to habitat for critically endangered Delta smelt. The fisheries agency tweaked the proposal to allow for slightly more water to go to fish habitat, but it didn’t satisfy environmentalists.

“Its outrageous,” said Doug Obegi, a senior attorney with the Natural Resources Defense Council in San Francisco.

He said he and other environmental groups are considering whether to challenge the action in court.

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In a Body Farm for Trees, Scientists Root Out the Killers

Researchers have spent decades tracking the lives and deaths of thousands of trees

Scientific American | October 5, 2017 | Zach St. George

In a corner of Sequoia National Park in California, Sierra redwoods stick out like colossal cinnamon sticks among the more common pines, firs and incense cedars. Nate Stephenson, a U.S. Geological Survey ecologist, makes his way up a hill, stepping over fallen logs. He stops in front of a small, dead red fir, which a hanging metal tag identifies as “189.” Stephenson points out a section of its trunk where the USGS field crew cut away the bark, revealing the squiggly signature of the fir engraver beetles crawled across the brown sapwood. Number 189 is just one of the more than 100 million trees researchers estimate died during California’s five-year drought, which ended this spring.

The drought—one of the state’s worst in centuries—devastated the park’s forests. The dead trees raise a series of questions for Stephenson: Why did some trees perish when others lived? Why did some parts of the forest suffer more than others? Why 189 and not its neighbor? “It’s a detective game,” he says. As the world warms, the answers could be critical in helping save forests struck by increasingly severe droughts. To predict the effects of these extreme events, scientists need to better understand how forests work normally—and for ecologists like Stephenson, that means figuring out why trees die.

Stephenson and his colleagues have spent decades studying thousands of dead trees—digging up roots to check for fungus, scraping away bark to search for beetle tunnels, looking for patterns among the dead. Since 1982 field crews have spent summers visiting plots scattered around Sequoia National Park. Each year they record the condition of all the trees in those plots; every five years they measure the diameter of the trunks. If a tree dies, they give it an autopsy. All told, they have tracked the lives of more than 30,000 individual trees.

For most of the years that scientists monitored it, tree 189 hardly changed. Between 1982 and 1987 it grew two centimeters, and then it stopped growing for the next 15 years. In 2000 it started to lean, after a neighboring tree toppled over and hit 189 on the way down. It also became infested with parasitic dwarf mistletoe. The next year brown felt mold covered its needles and the year after that some of its foliage yellowed. Then its trunk started weeping pitch. For the next decade it sputtered along, sickly and barely growing. Then, in 2012, the drought struck. In 2016 tree 189 died. Field crew members cleared the soil from its roots and found root rot, which had weakened it. But it was tunneling engraver beetles that ultimately doomed the fir.

There is immense value in having such a detailed history of an individual tree, says Beverly Bulaon, a U.S. Forest Service entomologist who helps train USGS field crews. Tracking a tree year by year lets researchers see exactly how it grows weaker and more vulnerable, as ailments and environmental stresses accumulate. Knowing this progression can help scientists understand which other trees are at risk, she says.

The stories of these trees are even more useful when studied as a collection. In a 2016 study published in *Ecology* USGS ecologist Adrian Das, Stephenson and their colleague Kristin Davis of Colorado State University’s Natural Resource Ecology Laboratory tracked the lives of more than 23,000 trees in plots throughout Sequoia National Park over a 13-year period. On average

about 2 percent of the trees died each year, with insects or pathogens destroying more than half of them. This was a surprise, Stephenson says—foresters have assumed that most trees that die under normal conditions simply lose the competition for light, water or nutrients.

The drought hit the year after the period covered in the Ecology study. In general, Das says, the organisms fatal to trees during the study were the same ones that killed them en masse during the drought. “It’s not a new suite of organisms,” he says. “They just start operating at different scales and in new ways.” Some of the culprits are well known, such as the pine beetles that boomed in population during the drought, Das notes. But less is known about many other organisms, such as another type of beetle that suddenly began assailing incense cedars during the drought or the weevil that started attacking young pines. Without baseline information about what killed trees before the drought, Das explains, ecologists would have overlooked these details.

Forests face a tough future, says David Breshears, an ecologist at the University of Arizona who was not involved in the study. Scientists predict hotter and deadlier droughts will strike forests as the climate changes. Many places have already experienced tree die-offs like California’s. Researchers have also found that over the last few decades the rate of trees dying under more normal conditions has increased dramatically in many parts of the world—including in Sequoia National Park. They think the rise in tree deaths is likely caused by stress due to insufficient water, and also perhaps because of escalated attacks by insects and pathogens. “There’s a lot of evidence that suggests we’re going to start losing a lot of trees,” Breshears says.

In Sequoia National Park Stephenson continues through a plot, passing trees 149, 6426, 265 and hundreds of others, living and dead, all with their dangling metal tags. He feels like the forest looks about the same as it did when he helped tag this plot decades ago. But it has changed—trees have grown and died, and new ones have sprouted—shifts that would have gone largely unnoticed without tagging.

Forests will continue to change in the future, likely faster than ever—but ecologists may still be able to protect especially valuable forests from climate change and other threats. In some places that might mean thinning trees—in others, watering trees or spraying them with pheromones that repel specific types of beetles. The strategy will depend on identifying which trees are most vulnerable, and to what. “This information we’re getting on what’s killing trees could help us buy time,” Stephenson says. “I don’t think we can stop change from happening but if we can ease a transition rather than have it all at once, probably everyone is going to be happier.”

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