BAY AREA WATER SUPPLY AND CONSERVATION AGENCY

BOARD POLICY COMMITTEE MEETING

February 3, 2017

Correspondence and media coverage of interest between January 25, 2017 and February 3, 2017

Correspondence

To: Council Member Michael Guingona, City of Daly City
From: Nicole Sandkulla, BAWSCA CEO/General Manager
Date: January 25, 2017
Re: Thank you letter

To: Mr. Ken Kirkey, Planning Director, Metropolitan Transportation Commission
From: Nicole Sandkulla, BAWSCA CEO/General Manager
Date: January 26, 2017
Re: ABAG MTC Correspondence Regarding BAWSCA's Comments to Plan Bay Area 2040's Draft Preferred Scenario

Media Coverage

Water Supply Conditions

Date: February 1, 2017
Source: KBTX
Article: Storms filled 37 percent of California snow-water deficit

Date: February 1, 2017
Source: Palo Alto Weekly
Article: Long drought ends for Santa Clara County

Date: February 1, 2017
Source: Record Bee
Article: State officials hesitate to declare the end to drought

Date: January 31, 2017
Source: Water Deeply
Article: Atmospheric Rivers: Five Breakthroughs in Analyzing West-Coast Storms

Date: January 30, 2017
Source: Today's News Herald
Article: It's time for a serious talk about water: well monitoring now seen as critical step

Date: January 30, 2017
Source: San Francisco Chronicle
Article: Even after epic storms, groundwater still depleted by drought

Date: January 30, 2017
Source: Water Deeply
Article: Big Rains Bring Both Good and Bad News for Salmon

Water Management:

Date: February 2017
Source: Bay Area Monitor
Article: Can We Quench Both the Thirst for Housing and Housing's Thirst?

Date: February 3, 2017
Source: Water Deeply
Article: Work Grows to Restore Mountain Meadows as Water Banks

Date: February 2, 2017
Source: Sacramento Bee
Article: Water, water everywhere in California – and not enough reservoir space to store it

Date: February 1, 2017
Source: East Bay Times
Article: Commentary: Fixing California water storage is not zero-sum game

Date: February 1, 2017
Source: The Almanac
Article: As it rains, state considers continuing drought rules

Date: February 1, 2017
Source: Sierra Star
Article: For tax raisers, end of drought is bad news

Date: January 31, 2017
Source: Water Deeply
Article: Saving Water is on Trend in the Apparel Industry

Date: January 26, 2017
Source: Sierra Star
Article: State water project allocation increased

Date: January 26, 2017
Source: Sacramento Bee
Article: Drought or not, water conservation must remain the norm

BAWSCA
Bay Area Water Supply & Conservation Agency

January 25, 2017

Mr. Mike Guingona
332 Peoria Street
Daly City, CA 94014

Dear Mr. Guingona:

The Bay Area Water Supply and Conservation Agency (BAWSCA) and the San Francisco Bay Area Regional Water System Financing Authority (RFA) were fortunate to have you as a member of their boards.

Your commitment and support of BAWSCA, its board, and its staff was crucial to building the strong regional organization we have today.

On behalf of the BAWSCA and RFA boards of directors, I would like to thank you for your leadership, dedication, and continued support of BAWSCA, its goals, and efforts to address the major issues that continue to face the member agencies and its customers.

The BAWSCA board of directors, BAWSCA staff and I wish you every success in the future!

Thank you Mike for all your efforts for water customers!

Sincerely,

Nicole Sandkulla

Nicole Sandkulla
CEO/General Manager

cc: Board of Directors, Bay Area Water Supply & Conservation Agency (BAWSCA)

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BAWSCA
Bay Area Water Supply & Conservation Agency

January 26, 2017

Mr. Ken Kirkey
Planning Director
Metropolitan Transportation Commission
375 Beale St.
San Francisco, CA 94105

Re: ABAG MTC Correspondence Regarding BAWSCA's Comments to Plan Bay Area 2040's Draft Preferred Scenario

Dear Mr. Kirkey:

Thank you for your December 29, 2016 response letter providing the Bay Area Water Supply and Conservation Agency (BAWSCA) with information detailing how our comments to the recently released Plan Bay Area 2040 Draft Preferred Scenario (DPS) are being considered by the Metropolitan Transportation Commission (MTC) and the Association of Bay Area Governments (ABAG).

The commitment of MTC and ABAG to include an analysis of the potential impacts to surface water and groundwater resources associated with the implementation of the proposed Draft Plan Bay Area 2040 is appreciated. BAWSCA also supports the direction to ABAG staff to develop an Action Plan to be adopted concurrent with Plan Bay Area 2040.

BAWSCA appreciates that MTC and ABAG intend to include BAWSCA in the stakeholder group assembled to provide input to the above-mentioned Action Plan, and looks forward to reviewing the Draft PEIR for Plan Bay Area 2040. Given the importance of this issue to BAWSCA's 26 member agencies who supply water to 1.78 million people in the Bay Area, BAWSCA strongly recommends that ABAG include these agencies in its future outreach on Plan Bay Area. Attached to this letter is a distribution list for ABAG's use for those future correspondences.

Please feel free to contact me at (650) 349-3000 as you work to coordinate BAWSCA's participation in the stakeholder efforts.

Sincerely,

Nicole Sandkulla
CEO/General Manager

Attachment: BAWSCA Water Management Representatives Contact Info

cc: Miriam Chion, ABAG
Water Management Representatives

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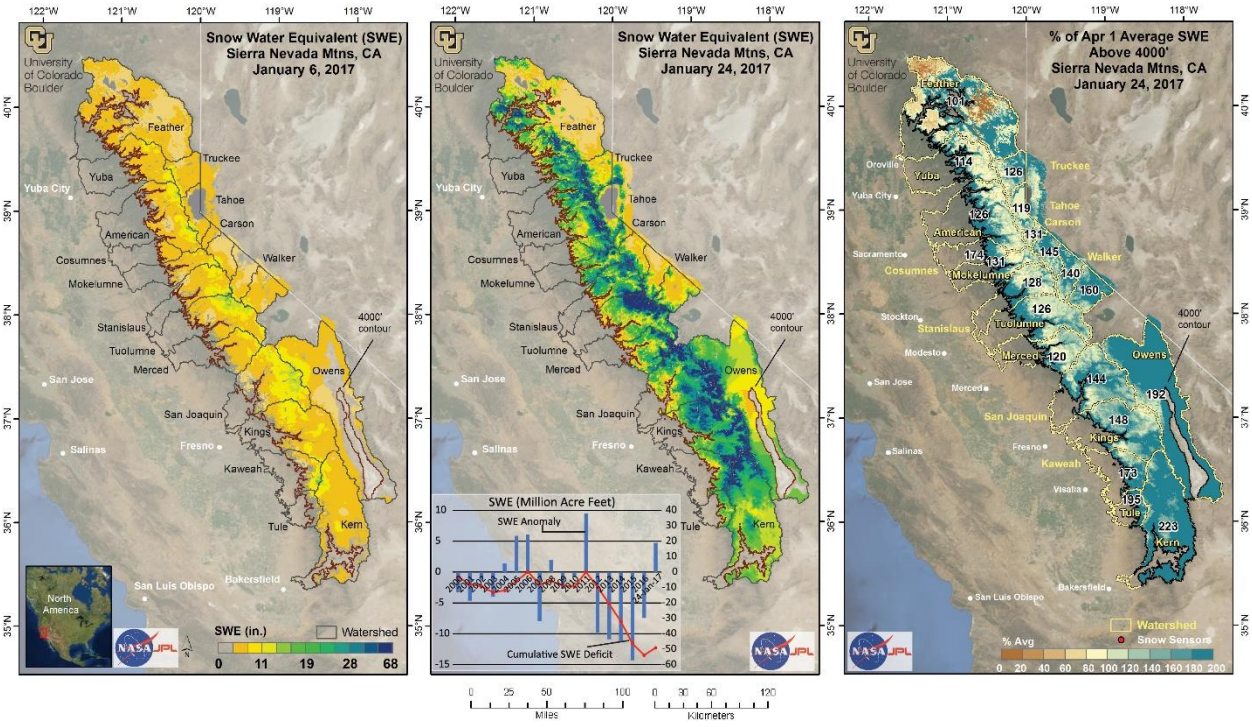
Storms filled 37 percent of California snow-water deficit
KBTX | February 1, 2017 | NASA

FEBRUARY 1st, 2017 -- The "atmospheric river" weather patterns that pummeled California with storms from late December to late January may have recouped 37 percent of the state's five-year snow-water deficit, according to new University of Colorado Boulder-led research using NASA satellite data.

Researchers at the university's Center for Water Earth Science and Technology (CWEST) estimate that two powerful recent storms deposited roughly 17.5-million acre feet (21.6 cubic kilometers) of water on California's Sierra Nevada range in January. Compared to averages from the pre-drought satellite record, that amount represents more than 120 percent of the typical annual snow accumulation for this range. Snowmelt from the range is a critical water source for the state's agriculture, hydropower generation and municipal water supplies.

To derive the estimate, the researchers combined data from NASA's Moderate Resolution Imaging Spectroradiometer (MODIS) instruments on NASA's Aqua and Terra spacecraft; a computer model jointly developed by the University of Colorado and NASA's Jet Propulsion Laboratory, Pasadena, California; and ground-based snow sensor data from the California Department of Water Resources, Sacramento.



Snow-water deficit is the deficit in water stored in snowpack compared with the annual average water stored in snowpack before the drought began in 2012. On average, California experienced a snow-water deficit of approximately 10.8-million acre feet (13.3 cubic kilometers) per year during the drought years of 2012 through 2016. The total deficit over that five-year period is roughly 54 million acre feet (67 cubic kilometers). The recent storms appear to have reduced that total by roughly 37 percent in less than one month.

Atmospheric rivers -- such as the so-called Pineapple Express phenomenon that affects the U.S. West Coast -- funnel large amounts of moisture out of the tropics and bring heavy rain and snow over short periods of time. In January, most of the higher elevations in northern California received more than 10 feet (3 meters) of snow in just over two weeks, with some locations receiving more than 20 feet (6 meters).

"Early in the January storm cycle, lower mountain elevations received some rain, but the vast majority of the mountain precipitation has come as snow -- which is exactly the way we need this precipitation," said Thomas Painter, a snow scientist at NASA's Jet Propulsion Laboratory, Pasadena, California, and principal investigator of NASA's Airborne Snow Observatory. "As snow, it releases to reservoirs and ecosystems more gradually and efficiently over the summer months."

Noah Molotch, who led the new study, cautioned that there is still a long way to go before California makes up its snow-water deficit completely. Molotch is director of CWEST and a research scientist at JPL.

"When the snow stopped falling five years ago, the state had to tap into its groundwater reserves to keep up," Molotch said. "One snowy winter won't be able to entirely reverse that, but there is, at least, some cautious optimism."

Molotch indicated that, with the much-needed snow, the recent storms also brought some flood risk.

"The concern moving forward relates to what happens with the weather for the rest of the winter," said Molotch. "Reservoirs across the Sierra foothills are now relatively full. If we get another intense atmospheric river with warmer air temperatures, that could lead to melting of the snowpack, and the risk for rain-induced flooding is considerable."

"The start to winter has been the best California has seen since 2011 and gives water managers hope for relief from what has been a historically dry five-year period," said David Rizzardo, chief of Snow Surveys and Water Supply Forecasting for the California Department of Water Resources. "The valuable data gathered by the CWEST and NASA Earth science teams gives the California Department of Water Resources a broader sense for how much water is being stored in our snowpack, allowing us to fine-tune vital seasonal runoff estimates, which are used by water managers and reservoir operators across the state."

The California Department of Water Resources will release the results of its most recent snow survey on Feb. 2. Final data will be available at that time.

# # #

Long drought ends for Santa Clara County

Water district to strike mandatory water use restrictions

Palo Alto Weekly | February 1, 2017 | Kevin Forestieri / Mountain View Voice

Months of wet weather have washed away much of the drought that plagued California over the last four years. With local reservoirs in Santa Clara County now filled to the brim and a healthy snowpack in the Sierra Nevada, water district board members agreed last Tuesday night to walk back mandatory water restrictions, while still calling for a 20 percent reduction in water use.

Unlike most of the Santa Clara Valley Water District board meetings over the last three years, district staff came forward with some good news about the local water supply. The northern Sierra Nevada mountains received an overwhelming 217 percent of normal precipitation since the start of 2017, and Santa Clara County has received 7.2 inches of rain -- nearly an inch more than normal -- as of Jan. 17.

All of the county's reservoirs are either full or nearly full, and two of the state's major reservoirs, Shasta and Oroville, are both at 124 percent of normal capacity, according to Deputy Operating Officer Garth Hall. Even in the event that the rest of 2017 is dry or even a "critically dry" year, groundwater storage will remain normal through the end of the year, Hall said.

The big question at the Jan. 24 meeting was whether to roll back the call for conservation made by the water district in June, which sought a 20 percent reduction in water use compared to 2013, and recommends that cities and water retailers impose mandatory water cuts on residents. If the water restrictions are completely lifted, board members argued, the years-long effort to encourage residents to conserve may be lost.

"We spent substantial resources convincing people to conserve," said board member Tony Estremera. "That's why we're so reticent to make it voluntary and make it sound like everything is okay."

Imposing water restrictions and pretending drought conditions still persist in Santa Clara County is going to be a hard sell to a community that knows better, said Anthony Eulo, the environmental services program director for the city of Morgan Hill, and one of several speakers calling on the board to suspend the mandatory water-use reduction.

"Our local reservoirs are as full as they can be, our state reservoirs are as full as they can be. There is essential water in the bank," Eulo said. "More importantly, we need to remember the community knows this."

Board members agreed to a compromise, voting unanimously for staff to come back with a resolution that continues to call for a 20 percent water use reduction target, but without the mandatory requirements on cities and water retailers. The resolution would include any restrictions imposed by the State Water Resources Control Board, which is expected to come out with permanent, long-term conservation measures next month in lieu of emergency short-term water reductions.

State requirements are likely to include a prohibition on runoff, water budgets for retailers, a greater emphasis on water shortage contingency plans and more requirements for agricultural

water providers, according to Jerry De La Piedra, the district's manager of longer-term planning and conservation. All of these would be included in a framework designed to make water conservation a way of life in California, he said.

The district, similarly, will likely continue to provide landscaping rebate programs to encourage residents to ditch water-hungry lawns, and forge ahead with grants for new technology like smart meters, giving residents greater control over their own water use.

Board chair Dick Santos said the kind of conservation Santa Clara County residents have shown over 2016 -- a 28 percent reduction in water use compared to 2013 -- needs to become normal practice in the coming years, regardless of drought conditions, because the state can't rely on a deluge every winter.

"We're in an arid region for the rest of our lives, and history will repeat itself again," he said. "We have to put money in the bank for the rainy days that don't come."

# # #

State officials hesitate to declare end to drought
Record Bee | February 1, 2017 | Paul Rogers

Gov. Jerry Brown will likely wait until spring to rescind the state's emergency drought declaration. Getty Images File

SACRAMENTO >> After a month of huge blizzards and "atmospheric river" storms, the Sierra Nevada snowpack — source of a third of California's drinking water — is 177 percent of the historic average, the biggest in more than two decades.

The last time there was this much snow on Feb. 1 in the Sierra was in 1995. Pete Wilson was California's governor, "Seinfeld" was the top-rated show on television and Steve Young had just led the 49ers to a blowout win in Super Bowl XXIX.

In a breathtaking shift for a state that had been mired in five years of punishing drought, 25 feet of new snow has fallen on Heavenly ski resort in South Lake Tahoe since New Year's Day. Freeways and schools across the Sierra have been closed at times, and firefighters are having trouble finding fire hydrants.

"Some are buried under 12 or 13 feet of snow," said Eric Guevin, fire marshal at the Tahoe-Douglas Fire Protection District in Zephyr Cove, Nevada, just north of the California state line. "We've had to use metal detectors to find them."

After a week to dry off, a new round of storms is set to roll into California. A Pacific system will dump up to 3 more feet of new snow in the Sierra by this weekend.

"It's a solid storm, not quite as big as some earlier this month, but it will still bring a decent amount of snow," said Tony Fuentes, a meteorologist with the National Weather Service in Reno.

On Thursday, officials with the state Department of Water Resources are scheduled to escort reporters up to a Phillips Station, a meadow off Highway 50 near Lake Tahoe, for the monthly manual snowpack reading. The event is largely a photo opportunity that measures only one site.

But daily readings from more than 100 electronic sensors across the famed Sierra range, which stretches 400 miles from Lassen County to the Tehachapi Pass in Kern County, show that the water content in California's vast "frozen reservoir" is already 108 percent of the April 1 historic average, with another two months still to go in the winter.

On Jan. 1, it was just 64 percent of the historic average for that date, and 23 percent of the April 1 average.

"We've had a tremendous increase in rainfall and snowfall so far this season," said Doug Carlson, a spokesman for the state Department of Water Resources. "It's way up there compared to a month ago."

State officials are still urging caution, however, and say that Gov. Jerry Brown isn't likely to make a decision on whether to amend or rescind the state's emergency drought declaration from January 2014 until April, when the full winter season is over. After his administration eased

state drought regulations last summer, most cities dropped surcharges, fines and lawn watering limits.

“We’re hoping people don’t get carried away by these figures and fail to recognize how quickly things can change,” Carlson said. “They can change on a dime. We are still encouraging people to be water conscious and consider water conservation to be a California way of life.”

The U.S. Drought Monitor, a weekly report put out by federal officials, reported last Thursday that 49 percent of California is no longer a drought, including every Northern California county from the Bay Area and Lake Tahoe to the Oregon border, although significant parts of Southern California and the San Joaquin Valley remain in drought.

The storms have filled reservoirs around the state. And as the year progresses and the snow melts, the runoff will send billions of gallons of additional water into rivers, streams, groundwater tables and reservoirs.

The snow also has been a bounty for Sierra ski resorts, which struggled mightily during the worst part of the drought. On Feb. 1, 2014, for example, the statewide Sierra snowpack was just 9 percent of the historic average, the lowest ever measured at that time of year — and even worse than the dismal 1976-77 drought, when it hovered in the mid-20s.

“It looks like we are headed into a record-breaking season and will be skiing well into July,” said Lauren Burke, a spokeswoman for Mammoth Mountain Ski Resort in Mammoth Lakes.

At 177 percent of average now, the Sierra snowpack is the biggest since it reached 207 percent on Feb. 1, 1995, according to state records. Since 1950, that year was the third largest snowpack, behind 1952, when it was 267 percent and 1969, when it was 230 percent, on Feb. 1.

This year, the Sierra snowpack so far ranks seventh.

# # #

Atmospheric Rivers: Five Breakthroughs in Analyzing West-Coast Storms

You need to understand atmospheric rivers – airborne water streams that deliver as much rain as hurricanes or tornadoes – if you live in the West. Fortunately, scientists are developing a wealth of new tools to predict and explain these storms.

Water Deeply | January 31, 2017 | Matt Weiser

A NOAA satellite image of water vapor from the atmospheric river storm that struck California on January 7. Image Courtesy NOAA

Atmospheric rivers are California's drought-busters. As we saw in the recent series of storms between January 7 and 10, a single wet weekend can dramatically reverse the state's water accounts.

The state still hasn't completely pulled out of the drought. But just a few days after those storms, the California Department of Water Resources increased its water delivery forecast for 2017 from 45 percent to 60 percent for water agencies that rely on the State Water Project.

Atmospheric rivers are just what they sound like: a column of water carried aloft by a narrow band of wind. The moisture usually originates in the tropics of the eastern Pacific Ocean and travels all the way across the sea in a narrow band before striking the U.S. coast – usually somewhere in California.

These events can deliver as much as 50 percent of California's water supply in as few as eight storms every year. But until recently, predicting them has been difficult. Meteorologists had no way to tell where an atmospheric river would strike, how wet it would be, or for how long. Now they have a variety of tools that help provide those answers. Here's a look at some of the progress:

1. Rock you like a hurricane? Yes, atmospheric rivers really do.

Experts on atmospheric rivers sometimes use the phrase "horizontal hurricane" to explain how these storms work. And it's apt, because atmospheric rivers usually manifest as a long, narrow band of high-intensity rainfall that reaches across the Pacific Ocean before targeting California.

Now we know these storms are also just as wet as a hurricane or tornado.

The big storms that hammered California from January 7-10 amounted to at least three and possibly four separate atmospheric rivers. The precipitation they delivered approached 20in (51cm) at some locations along the coast and in the Sierra Nevada, said Michael Dettinger, a research hydrologist at the U.S. Geological Survey who studies atmospheric rivers. That equals the rainfall often delivered by major hurricanes in the southeast or tornadoes in the Midwest.

"Very often in California, we have a big storm and it's sort of like, 'Well, I'm sure somebody in the Midwest wouldn't think much about this storm. We're just these Californians who are used to sunny weather,' and all that," Dettinger said. "But factually, our biggest storms are hurricane-scale storms. And there's no place other than the hurricane belt that you get storms this big. So really, when we have a big, bad storm here, there's no reason to apologize. Our big, bad storms are as bad as anyone else's."

2. How big? Scientists now have a way to rate them.

Weather experts use the Saffir-Simpson scale to rate hurricane intensity and the Fujita scale to rate tornado strength.

Now there's a way to rate extreme precipitation events like atmospheric rivers. It's called the R-Cat scale, short for "rainfall category." Dettinger helped develop it as a way to objectively rank rainfall events, no matter where they occur.

If more than 8in (200mm) of rain falls at any measuring station over a three-day stretch, that earns an R-Cat 1 rating. The scale steps up from there with every additional 4in (100mm) of rain. An R-Cat 3 event, for instance, means a weather station got 16-20in of rain over three days. R-Cat 4 (the biggest, at least so far) means more than 20in over three days.

During the January 7-10 storms, many areas on the coast and in the Sierra Nevada saw R-Cat 2 rainfall levels, or more than 12in of rain. A handful saw R-Cat 3 levels, or more than 16in, including the town of Venado, near the coast in Sonoma County; and Downieville in Sierra County.

One location, Strawberry Valley in Yuba County, near Sly Creek Reservoir, saw 20.51in of rain, or 521mm, in three days. That puts it in R-Cat 4 territory, one of the largest rainfall events ever recorded in California.

"The extremity and rarity of the largest events is quite comparable to hurricanes and tornadoes," Dettinger says. "So when we say it's an R-Cat 4, that's a big thing. It could be as far back as 2006 that we last had one of these show up."

3. Extreme rainfall is strongly linked to atmospheric rivers.

The number of R-Cat 3 or 4-rated rainfall events every year roughly matches the number of major hurricanes that occur annually in the Atlantic or the number of extreme tornadoes in the Midwest.

Dettinger used the new rating scale to look back at previous storms over the past 60 years. He found there have only been about 48 events that ranked as big as R-Cat 3 or 4. Of these, Dettinger said, 92 percent were associated with atmospheric rivers, and 90 percent were in California.

"They almost always happen in California, and they're almost always associated with landfalling atmospheric rivers," Dettinger said.

4. Those ratings, and more, may soon show up in forecasts.

This map illustrates a new atmospheric river forecasting tool developed by the Center for Western Weather and Water Extremes. The red bars on the left illustrate the 90 percent probability that an atmospheric river will strike the black dots on the coastline, each of which represents a point of latitude. The map, produced on January 19, indicates the Los Angeles-San Diego region faces the greatest likelihood of seeing an atmospheric river within about two days. (Center for Western Weather and Water Extremes)

The rainfall ratings aren't just for scientists. They can also help the public gauge the intensity of an approaching storm. And they could show up in your nightly weather forecast soon.

Ten years ago, the National Weather Service was reluctant to forecast rainfall amounts more than three days out. There was too much uncertainty to ensure useful information.

Now, that window has grown quite a bit. Forecasters can now estimate storm intensity and rainfall as much as 10 days out. And within five days, they can start to tell us something about where the atmospheric river will strike the coast. That's a big stride from just a few years ago, when forecasters would often liken an atmospheric river to a "loose fire hose" flailing around and gushing water unpredictably.

"We're beyond that now," said Marty Ralph, director of the Center for Western Weather and Water Extremes, a branch of the Scripps Institution of Oceanography at U.C. San Diego and the leader in atmospheric river research. "We have a pretty good sense of when they're coming, and the hose isn't flapping as much."

Ralph said researchers can now predict within 500-600 miles (805-965km) where an atmospheric river will make landfall, and they're working to shrink that range. For instance, their computer models can now plot the likelihood that an atmospheric river will strike each degree of latitude on the Pacific Coast, from Baja California to Alaska.

The next step is to include R-Cat ratings in regular forecasts. We might hear, for example, that a storm bound for California has "R-Cat 3 rainfall potential." This could help vulnerable areas prepare for flooding, mudslides and road closures.

"The pieces are all there to express forecasts in these terms," said Dettinger, who is also a Scripps research associate and a principal investigator on Ralph's team.

5. The next frontier is duration and elevation.

Two other factors determine how wet and wild an atmospheric river will be: The snow level, and how long it lasts.

A warm storm with high snow levels means more of the watershed is contributing to streamflow, which can increase flood risk. It also melts a portion of any existing snowpack, boosting streamflow beyond what the clouds deliver. A 2,000ft (610m) rise in snow level, Ralph said, can triple the amount of runoff.

"What happened as the big atmospheric river came in on Saturday [January 7] was the snow level jumped from 5,000ft (1524m) above sea level all the way up to 10,000ft (3048m) in about four hours," Ralph said. "None of the models predicted that, but we saw that in real time."

That's because Ralph's team has 10 vertically pointing weather radar units installed at important reservoirs around the state. These record precipitation as it changes from rain to snow, and the elevation at which that occurs. They've been in place for several years. But because of the long drought, they are only now getting regular use in atmospheric river research.

"This winter is allowing us to see how they perform much better, and to start to see how they might be useful for people who are affected by the snow level," Ralph said. "Nowhere else in the world has this kind of data."

Duration is a similar concern. How long an atmospheric river stays parked over a particular region determines how wet things get. And it's not a linear relationship: An atmospheric river that lasts for 40 hours, Ralph said, can deliver seven times more rainfall than a 20-hour event.

The Center for Western Weather and Water Extremes has an enormous amount of data on its website to help predict, monitor and measure atmospheric rivers. A lot of it is not comprehensible to the layman. But they are working to bridge that gap with improved graphics, and new tools like duration and snow-level predictions.

“I suspect by next winter, if not sometime this winter, they’ll become part of our bag of tricks we put online for everyone to see,” Dettinger said.

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# # #

It's time for a serious talk about water: well monitoring now seen as critical step
Today's News Herald | January 30, 2017 | Aaron Ricca

The big storms are over for now, but unless the Hualapai Basin magically refills soon – and it won't barring a flood of biblical proportions – water will continue to vex public officials and be a source of worry for residents.

Finding ways to divert and store the next downpour was one of many topics city officials, the Mohave County Board of Supervisors and water and geology experts discussed in depth at a water workshop Jan 13.

Local geologist Luis Vega started off the meeting by describing the basic geology of the Hualapai Basin and how the aquifers under north Kingman and Red Lake play a critical part in Kingman's water supply. Depending on the population and agricultural growth, the picture looks something like this:

Provided Kingman stops growing right now, with the aquifer's current level, there is 216 years of water left. That includes a yearly city usage rate of 8,000 acre-feet and yearly farming usage rate of 25,000 acre-feet. The numbers change to 115 years of water left with an annual three-percent population growth and 75 years with both population and agriculture increases.

Of course, the data Vega depended on was produced in 2011, a few years before a number of large scale farming operations broke dirt and planted crops in Mohave County.

"A simple way to look at it is you got a bucket of water and a straw taking water out of this bucket nd you have a little trickle going into the bucket.," Vega said. "Eventually the straw taking the water out is going to win over that little trickle going into the bucket."

Water Quality an Issue

There's still plenty of water in the aquifer, but not all of it is readily usable. There's fresh water near the surface, but the water turns to brackish salt water at the deeper levels.

"You may have heard people say that there is a lot more water in these basins than what Arizona Department of Water Resources says there is," he said. "The question is, is it good water?"

The Red Lake subbasin holds the largest inland salt deposit in the U.S. at nearly three miles long and a mile deep. All the water in contact with that deposit is salt water and the deeper it goes, the higher the salinity. There are also contaminants such as arsenic in the deeper levels.

"(The water) is not usable unless you treat it," Vega said.

Vega said one of the biggest problems is that Kingman doesn't have surface water, such as a river, to replenish the aquifer.

"What's in the ground is there," he said.

Well Monitoring

Vega described anomalies known as cones of depression that are formed when a well is drilled and that monitoring them is critical to keeping an eye on the water levels.

“Where this is important is the larger wells that are pumping a lot of water…you want to know what impact they’re having on the water table,” he said. “If you don’t’ have a monitor well close by, it may be years before you see the damage to the water table.”

According to Vega’s data, the water table has dropped 80 feet in the last 54 years. More water is being pumped out (32,000 acre-feet per year) than going back in (10,000 acre-feet).

Vega laid out possible courses of action for Hualapai Valley starting with either an Irrigation Non-Expansion Area or an Active Management Area, both of which involve slowing or stopping low priority, high volume water uses (agriculture). Another step would involve finding ways to recharge the aquifer – such as diverting rain runoff into recharge ponds. The state already has shot down the county’s request for the former, commonly referred to as an INA.

Vega said rainwater that makes its way to the desert basins near the airport and Red Lake either evaporates or soaks into the caliche, preventing the water from infiltrating into the basin.

“If there was some way to get that water into the aquifer, it would increase that trickle going into the bucket,” Vega said.

Conservation Measures

He suggested the county implement conservation measures, but even those couldn’t make up for the loss. As a last ditch measure, he suggested Arizona foot the bill for a California desalination plant for its own water uses while Arizona would use Colorado River water normally sent to California.

“There other ideas like that that need to be addressed,” he said. “We should be addressing that now.”

One of Vega’s simplest suggestions is for those already owning wells to install sounding tubes.

“It doesn’t cost very much, maybe $200,” he said. “It’s just a piece of PVC pipe put down alongside the (drop pipe) where you can put down a low-tech instrument to measure the water.”

Nick Hont, civil engineer for Mohave County Development Services Department, reiterated (in more exact engineering terms) Vega’s presentation, and said a larger study is needed to determine future water usage.

Outdated Data

He said the most recent United States Geological Service studies were based on data from 2011, before agriculture began in Kingman and that the new farms have drastically modified and increased the water withdrawal.

Hont laid out plans for a possible $450,000, three-year impact study where USGS, Mohave County and City of Kingman would split the bill.

The survey would accurately establish water withdrawal effects with models to predict impact on Kingman wells and anticipated time frames for changes of aquifer water levels.

Those models would also be used to predict the impact of proposed mitigating measures of water injection into the recharge basins and different models would be developed by county and city officials.

Hont is confident the USGS will give the city and county the best bang for the bucks. He said he's worked with private consultants who could charge twice as much.

"It's going to be a three-year program to get an accurate model," he said. "We're getting the best scientists. This is the United States government."

State is Engaged

"Let's start doing it," he added. "It's not too late."

Environmental attorney Patrick Cunningham was another guest speaker and assured the audience that the state is paying attention.

He said Gov. Doug Ducey has studied Mohave and La Paz water issues and wants to work with state agencies and local s to create solutions that can be implemented.

Cunningham said state Rep. Regina Cobb, R-Kingman, has introduced a bill and is working on another to expedite the process for Mohave County.

"Monitoring our aquifers and seeing how healthy (they are) is absolutely required," Cunningham said.

There were a significant number of statistics and other information presented during the workshop. The video can be viewed at http://www.cityofkingman.gov/IWantTo/ViewVideos.aspx

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Even after epic storms, groundwater still depleted by drought
San Francisco Chronicle | January 30, 2017 | Peter Fimrite

The blizzards that ravaged the Sierra Nevada in the past month wiped out more than a third of the California snowpack deficit that built up over five years of drought, a team of scientists said Monday, while encouraging state residents to continue conserving water.

The storms deposited roughly 17.5 million acre-feet of frozen water in the Sierra, or 37 percent of what's called the "snow water deficit" in the state, according to a study by the University of Colorado and NASA's Jet Propulsion Laboratory.

"This winter, from my viewpoint, dropped an impressive amount of snowfall and made a significant dent in the water deficit, but it certainly didn't come close to relieving the total deficit for the entire drought period," said Noah Molotch, a research scientist at the NASA Laboratory and director of the University of Colorado's Center for Water, Earth Science and Technology.

The snow water deficit is defined as the amount of frozen water below what is normal for a period of time. California's average yearly deficit during the drought was 10.8 million acre-feet, according to the study, or 54 million acre-feet from 2011 to 2016, said Molotch, who led the study.

One acre-foot of water is enough to cover an acre of land in a foot of water — generally enough to supply a single family with water for a year.

The storms in January dumped enormous amounts of rain and snow, breaking records and filling almost every major reservoir. In the northern Sierra, more rain has already fallen this winter than during an entire average year. The water content of the snowpack across the Sierra is now about 180 percent of normal for this time of year.

The heaping snow drifts prompted the government's Drought Monitor to classify 49 percent of California as free of drought last week, a recovery from the 5 percent figure a year ago. All of the Bay Area, except for a tiny portion of Santa Clara County, was drought-free, according to the federal index, as was the northern half of the state, from San Francisco to the Oregon border.

The problem, Molotch said, is that California pumped huge amounts of groundwater to keep people and crops hydrated during the drought, depleting what is essentially a water savings account.

"It's pretty clear that we aren't going to be able to put water back into that savings account as fast as we were able to take it out," he said. "For three weeks' worth of snowfall it was pretty amazing, so there is reason for optimism, but one snowy winter will not be able to reverse multiple years of drought."

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Big Rains Bring Both Good and Bad News for Salmon

California's drought has hit fish populations hard. Now that heavy rains have returned to the state, it would seem to be a boon for fish, such as salmon, but actually the heavy rainfall has had both positive and negative impacts.

Water Deeply | January 30, 2017 | Alastair Bland

The five-year-drought could hardly have been worse for some of California's fish populations. The Sacramento River's winter-run Chinook, for example, were nearly extinguished by low water supplies and sloppy handling of reservoir releases during the endangered salmon's spawning season. The delta smelt, too – a key biological indicator species – is now closer to extinction than it has ever been. On the Klamath River, potentially deadly parasites that thrive in low-flowing rivers infected most of the Chinook born in 2014 and 2015.

After weeks of heavy rains and a mounting snowpack in the Sierra Nevada, California's drought is easing, and according to the U.S. Drought Monitor, Northern California is drought-free. That should be good news for fish.

"All this rain is definitely a good thing," says Dave Hillemeier, the director of the Yurok Tribe's fisheries department. He says fast, gushing flows could potentially wash out of the river system a species of worm that serves as a host to the problematic fish-killing parasite Ceratonova shasta, which has been linked to population declines of Klamath steelhead and salmon.

"One day of huge flows would make life miserable for these polychaete worms," Hillemeier says, explaining that rapid currents can not only sweep away the creatures themselves but also the algae on which they feed.

In the Central Valley, high flows are also a boon to fish, especially when rivers spill their banks. Research has consistently shown that numbers of young fish spike in the months following wet winters – probably because they create valuable, if only ephemeral, floodplain habitat for the fish.

However, too much rain at once can spell trouble for a river and its fish. High flows can wash away gravel beds containing incubating eggs – what biologists call "scour." Rapid increases in flow can also bury and suffocate eggs with fine sediment or even sweep young salmon prematurely out to sea. These impacts are especially problematic in river valleys that have been overhauled by human activities such as logging, levees, dams and development.

"It's not that the salmon aren't able to tolerate droughts and floods," says Eric Ettlinger, aquatic ecologist for the Marin Municipal Water District. "It's that their habitat has been so altered that the rivers don't work the way they should anymore."

For example, Lagunitas Creek and its lower tributaries, which flow off the highlands of western Marin County, have been lined with bank fortifications and berms that confine the streams to their main channels. This looks tidy and effective from a land use perspective, but it makes the fish that live in the river extremely vulnerable to flooding as well as drought. That's because water that overflows a river's banks creates slow-moving sprawls of habitat – perfect places for young fish to take refuge from the raging currents that may scour out the main channel. Such

overflow also creates groundwater recharge, which feeds into streams and can keep them flowing through months, or even years, of drought. Eliminating natural flooding cycles eradicates these ecosystem benefits.

Dams have introduced other challenges for Lagunitas Creek's coho (a member of the salmon family). The barriers prevent the fish from spawning in the watershed's high headwaters, where the salmon historically laid and fertilized their eggs. Such small creeks, Ettlinger explains, are far less susceptible to the scouring effects of flooding than the lower reaches of the system, where tributaries merge together and create gushing torrents during rainy periods.

Today, Lagunitas Creek's coho are barely clinging to existence, and the wet winters that should be so welcomed can actually have drastic negative impacts on the population. In the winter of 2005–06, heavy rains coincided with the egg incubation period of the stream's coho. The number of spawning adults crashed from roughly 400 to just 50 in the space of two years. Ettlinger guesses the fish, 600 spawners strong at last count, will take a similar hit this year.

Ted Sommer, a lead scientist with the California Department of Water Resources, says 1,800 Chinook salmon spawned last fall in Putah Creek, a Sacramento tributary with headwaters in Napa County. It was one of the largest returns in memory.

But Putah Creek, like so many rivers, has been channelized with riverbank modifications. This, Sommer says, "creates a fire-hose effect as water shoots straight down the river channel," and he believes many or most of the incubating salmon eggs have been lost to the heavy flows of December and January.

However, few examples so clearly show the potential of heavy rains to devastate rivers as the North Coast's 1964 Christmas floods. That December, the Eel River – in recent years just a trickle of water – exploded to one-and-a-half times the average volume of the Mississippi. Towns were swept away, and redwood trees that had grown for a thousand years were stripped from the earth.

Erosion was cataclysmic on recently logged mountainsides, says Scott Greacen, executive director of the group Friends of the Eel River.

"When you take the trees off those slopes, the earth's surface melts," he says. "When those rains fell, the mountains just came unzipped."

Rocks and sediment buried river sections where fish spawned. In some places, pools that were 80ft (24m) deep and provided valuable year-round cold water – essential for salmon – were filled in with rocks and sand.

"The river was structurally altered," Greacen says.

The same rainstorms clogged and buried parts of the Klamath River and its main tributary, the Trinity. Greacen says a local geologist told him that it might take 7,000 years for natural processes to erase – and quite literally wash away – the effects of that rainy winter.

Fishery biologist Jacob Katz, of the group California Trout, has spent years studying the benefits floodplains provide for fish. His work has been focused recently on the Sacramento River. He and other scientists attribute the long-term decline of the Central Valley's wild, self-sustaining salmon populations in large part to the levees that have disconnected the river from its adjacent floodplains. Today, those agricultural flatlands flood only during extreme weather events, whereas they used to be inundated most, if not all, years.

Katz's research has all but proven that salmon cannot survive without annual flooding. He acknowledges the impacts that floods can deliver to some rivers, especially those stripped of the protective wetland and woodland buffers that soak up runoff and release it slowly and gently into the river.

Overall, however, Katz says the benefits of precipitation far outweigh the impacts.

"It's years like this one that it's good to be a salmon in the Central Valley," he says.

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Can We Quench Both the Thirst for Housing and Housing's Thirst?
Bay Area Monitor | February 2017 | Robin Meadows

The San Francisco Bay Area is likely to be a lot more crowded in the near future, adding a projected 2 million people to the 7.5 million who already live here over the next quarter century. Planners traditionally focus on meeting housing and transportation needs as the region grows. But more people also means more demand for water — and choices we make today will determine how far our water goes in the future. Now, regional planners have begun to address the disconnect between land use and water supply.

Whether or not we have enough water for growth depends on factors including climate change and the way we grow. "Climate change is a little out of our control, so we should focus on what we can control: the urban form and water efficiency," said Laura Tam, sustainable development policy director of SPUR, a nonprofit dedicated to urban planning. "If we can sustain the current rate of water conservation, we could add only a fraction of water use even if we add millions of people to the Bay Area," she explained.

In 2010, California's per capita water use in cities was 178 gallons a day. And by 2015, several years into our recent severe drought, that was down to 130 gallons a day. "One of the most encouraging outcomes of the drought is that we found out how much urban water use is discretionary," Tam said.

Strategies for shrinking the water footprint of new housing include compact development, or urban infill comprising multi-family housing with shared green spaces. "The average urban housing unit is more water-efficient than a suburban house," Tam said. Compact development has less landscaping, which typically accounts for one-third of residential water use statewide. In addition, perhaps a tenth of California's water supply is lost to leaks, and compact development means shorter pipelines, which inherently reduce the chance of leaks.

Compact development can also help low-income people save money, in part by letting them live closer to work. When low-income people live far from their jobs, transportation costs can be as high as housing costs, according to a 2006 report from the nonprofit Center for Housing Policy. In contrast, living near a city center decreases transportation costs by an average of 40 percent.

Another way to keep growth's water demand in check is water-neutral development. This approach offsets the increased water needs of new housing via a combination of conservation and retrofits to existing developments. "Many old buildings have old fixtures, and the amount of water you can save with new ones is very significant," Tam said. Installing water-efficient fixtures could save 22.5 gallons per person per day, according to a 2014 report by the Pacific Institute and the Natural Resources Defense Council.

The East Bay Municipal Utility District requires water offsets when new housing is annexed to its existing service area. So far, the district has struck deals on six water-neutral developments, according to a 2015 report by the Alliance for Water Efficiency. Similarly, some Bay Area cities are requiring water offsets before moving forward on proposed developments, said Nicole Sandkulla, CEO of the Bay Area Water Supply and Conservation Agency (BAWSCA), which represents 26 water suppliers in Alameda, San Mateo, and Santa Clara counties.

The City of Brisbane, for example, is requiring water neutrality for the proposed Baylands development, 4,400 residential units on a former landfill and rail yard near the shores of the Bay. “The city says there’s not enough water and asked the developer to come up with it,” Sandkulla said. Likewise, Redwood City is requiring water neutrality for the proposed Saltworks development. This controversial project initially entailed up to 12,000 residential units on a former commercial salt production site on the edge of the Bay.

Moreover, the City of East Palo Alto is so tight on water that a building moratorium is in effect through the summer of 2018. And, said Sandkulla, other BAWSCA cities are short on the water needed to supply new development mandates proposed by the Association of Bay Area Governments (ABAG) under the forthcoming Plan Bay Area 2040. “ABAG is looking to push more people into the West Bay urban corridor, but some cities don’t have enough water,” she said. “ABAG needs to check in with water suppliers earlier — the focus has been on housing and transportation, but the other finite resource we have to address is water.”

In a letter to regional authorities last October, Sandkulla wrote, “We strongly urge you to work with local water suppliers to consider the long-term water supply reliability implications of your regional land use planning effort.”

ABAG’s current regional housing plan states that “local jurisdictions consider infrastructure requirements, including water and sewer capacity, when developing their general plans and neighborhood plans” but then adds that “this information is not used to limit a jurisdiction’s housing allocation.” In addition, there is little mention of the water supply in the current Plan Bay Area, which was adopted in 2013, said ABAG resilience planner Michael Germeraad.

But he does see signs of better coordination between land use planning and the water supply. “In the past, there was less pressure on discussions of growth and water,” Germeraad said, adding, “Now, we’re moving towards considering water earlier in the process.”

ABAG’s 2015 annual meeting focused on actions cities and counties can take for drought resilience, and in 2016 the agency began facilitating meetings between elected officials and water utilities to discuss growth. “Understanding the water supply could inform the development process — for example, we could build differently to reduce water consumption of new units,” said Germeraad, citing built-in dual pipe systems for drinking water and graywater as an example.

The need to plan our future water use is further intensified by climate change. In the years to come, the Sierra Nevada snowpack that provides much of the Bay Area’s water will likely be smaller, and the snow that does accumulate will likely melt before the end of the dry season, when we need it most. And, Germeraad pointed out, if our water supply drops as our population grows, “the water that we do have will be shared by more people.”

Work Grows to Restore Mountain Meadows as Water Banks

A new round of state grant funds will launch a number of projects to restore Sierra Nevada meadows for habitat and water supply. Luke Hunt explains how momentum is building to tackle these projects.

Water Deeply | February 3, 2017 | Matt Weiser

As California ponders its long-term water supply challenges, one solution getting increased attention is Sierra Nevada meadow restoration.

Those high-mountain meadows historically acted as sponges, capturing spring snowmelt to recharge groundwater and provide vital wildlife habitat, then discharging it slowly in late summer and fall to keep streams flowing until winter storms returned.

But, starting in the late 1800s, that function has been degraded by rural development, road building and livestock grazing. Many mountain meadows have been cut by deep channels that allow snowmelt and storm flows to run off too quickly, and the opportunity to recharge soils and groundwater have been lost.

Now, however, the benefits of meadow restoration have been embraced, and many new projects are being funded. One of the leaders in this field is American Rivers, a nonprofit conservation group that began working on meadow restoration in 2010. It recently was awarded three state grants of about $670,000 for meadow restoration projects in the Sierra Nevada, out of eight projects in total that received grants in a new wave of state funding for this work. Water Deeply recently spoke with Luke Hunt, director of headwaters conservation at American Rivers, to learn more about this work.

Water Deeply: Is this round of grant funding a new thing in meadow restoration?

Luke Hunt: This is really brand new. It all really stems from meadow restoration being called out in the California Water Plan and, specifically, in the Governor's Water Action Plan. The water action plan has been driving a bunch of Proposition 1 (water bond) investments as well as other investments.

Last year, there was a sizable award from the Department of Fish and Wildlife from cap and trade (greenhouse gas mitigation) funds. In this case, the cap and trade funds were going toward watershed restoration that would improve carbon storage in soils. It's not totally known what the net effect of meadow restoration on greenhouse gas emissions is, but there was about $6 million that funded 10 or so projects. That was the very first big investment in meadow restoration and it came from the state. In the last two years, things have really changed.

Water Deeply: Why did American Rivers get involved in meadow restoration?

Hunt: Meadows are one place where restoration is really obvious. You walk onto the spongy soils of the meadow and the connection is really clear between meadow health, water storage and streamflow – and the connection between meadow health and river health. You can feel it under your feet – a healthy meadow is really spongy.

We see it as sort of a gateway to looking at the larger watershed. So what we want to do is leverage the momentum we're building around some of these meadow restoration projects and take a larger watershed approach and look at things like forest roads that also have significant impacts. Not only are these connections clear, but also making a change over a relatively small

acreage has a big watershed benefit. And not only for water quality and water supply, but also for species like Yosemite toad and Eagle Lake rainbow trout. Those are two species that will benefit from these most recent grants.

Water Deeply: How did meadows become degraded?

Hunt: The short answer is historic land use practices. Shortly after the Gold Rush, people moved into the meadows of the Sierra with their livestock and did a number of things. They ditched meadows, they built roads through them and did other things that changed the water courses.

The reason they ditched these meadow is they were a place where they had a homestead, and they wanted to be able to use the meadow. They wanted to get the cows on there early in the season, so they wanted to dry out the meadows. So they would ditch it. These would be hand-dug ditches on the order of a couple feet deep. And they would straighten out the stream channels. Then erosion in these ditches would eventually create a ditch that was maybe 8 feet [2.5m] deep and maybe 50 feet [15m] wide. This then acts like a French drain to drain the surrounding water table down to that downcut elevation.

Meadows are floodplains. What they naturally do is, during spring snowmelt, the energy of a whole lot of water flowing down is dispersed over the whole meadow surface. When you carved a ditch or if intense overgrazing has compacted the soils and allowed the banks to become destabilized, once the channel gets big enough that it can hold more of the floodwater, then instead of the energy dissipating over the whole floodplain, it's concentrated in the channel. That leads to a feedback where there's more erosion and incision of the stream channel, which causes even more erosion. It leaves the natural floodplain perched high.

So in some of these meadows, they used to flood annually or every few years, and now they won't even flood during a 500-year storm because the channel has been cut so deep. It's one of those things that won't correct itself even in places that haven't been grazed in 30 years.

Water Deeply: Why is it important to restore meadows?

Hunt: Meadows are well known to be hotspots for biodiversity. So the species benefits of restoring these areas are really large.

They are also able to maintain cool, flowing streams up high in the Sierra. Those stream temperatures and summer streamflows are going to be under pressure with climate change. As more winter storms fall as rain instead of snow because of climate change, we need to be able to maintain this water in the upper watershed not only for people and for water supply, but also for all the habitat benefits and for healthy forests.

Water Deeply: What work has been done so far?

Hunt: A lot has been done already in terms of finding best practices. Meadow restoration started in the 1930s and 40s. The Conservation Corps would go out and fill some of these gullies with brush dams and check dams, and they would clear encroaching conifers from a meadow.

Water Deeply: How much work is still left to do?

Hunt: Well, the U.S. Forest Service estimated in 2015 that more than half of all meadows on Forest Service land are degraded with eroded channels. That amounts to 110,000 acres [44,515 hectares] of degraded meadow, and restoring all of them would result in 35,000 acre-

feet [43.2 million cubic meters] of increased groundwater storage. About 60 percent of meadows in the Sierra are on Forest Service lands. The rest are largely private or in national parks.

In the past, so many people have been working in isolation. Now, in the last five years, it's become more of a coordinated movement – less about the Forest Service acting independently – and now there's more transfer of knowledge. That's really going to make meadow restoration a lot more of an effective process and a lot more of a better investment as well.

Water Deeply: What are the water supply benefits?

Hunt: Timing is the key one. Where a channel has been eroded into the meadow, the water quickly drains out of the upper watershed, out of the rivers, over the dams and out to the ocean. But when the floodplain is engaged and the meadows can soak up this water, it provides flows for later on in the season, and that's really what California needs.

In one meadow we studied (Indian Valley in Alpine County, part of Mokelumne River watershed), in September the meadow provides the same amount of flow after restoration as the whole watershed above. The meadow doubles the flow and it's a relatively small creek.

What meadows do is they keep these small tributary streams flowing longer and at higher flows as we go through our annual drought. Essentially what happens is, you trade lower streamflows in winter for higher flows later in the summer. Water Deeply: What are your plans to expand meadow restoration?

Hunt: What we would like to see happen is to have a solid queue of projects coming forward. What that means to us is, in places in the Sierra where there aren't projects happening, to build support and capacity to do projects in those areas. So we'll continue to do pilot projects in places where we think demonstrating success will lead to more projects on the ground.

We're also looking at expand into other places across the nation, probably first in the Rockies and Cascades where American Rivers has significant capacity.

Water Deeply: What can people do to help?

Hunt: Well, we can thank everyone for passing the water bond (Proposition 1 in 2014). Another thing is to support the corporate and water agency financing of these upper watershed places.

Also, people can help get the world out more about the importance of meadow restoration and watershed condition to the health and prosperity of Californians. The Sierra Nevada watersheds provide enormous benefits to the people of California. But the big missing link is that the bulk of the people of California don't live in the Sierra Nevada. So it's investing outside of where they live that's really important.

The best investment you can make for California's overall prosperity is to invest in the health of our natural watersheds.

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Water, water everywhere in California – and not enough reservoir space to store it
Sacramento Bee | February 2, 2017 | Ryan Sabalow, Dale Kasler and Phillip Reese

After five years of drought, could California really have so much rain and snow there's no room to store all the water?

The answer – as the state's water picture careens from bust to boom – is yes.

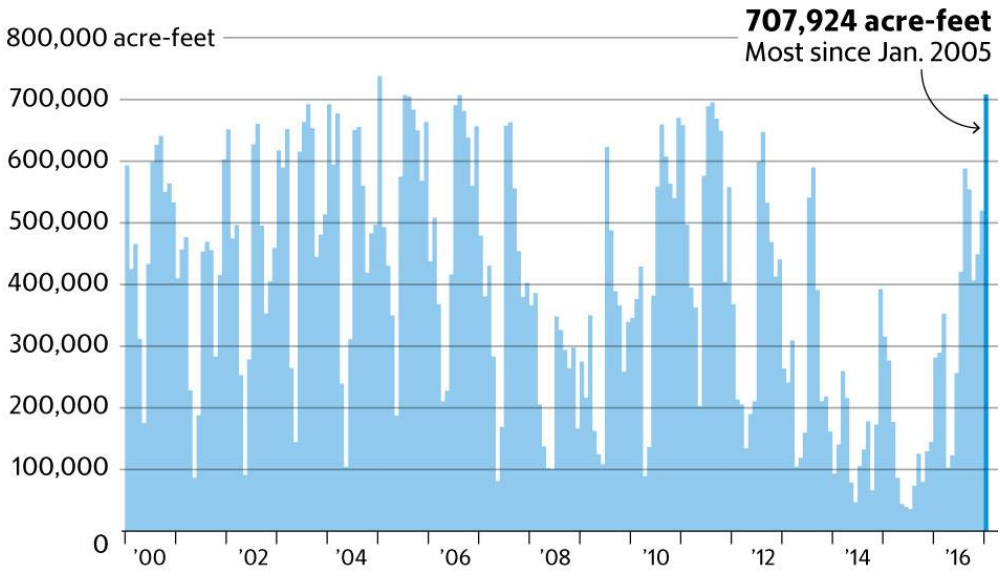
One month into an exceptionally stormy 2017, river flows though the Sacramento-San Joaquin Delta have been so powerful that the massive pumps that ship north-state water to Southern California and the San Joaquin Valley have roared at full throttle for weeks. The federal and state pumping stations near Tracy delivered more water in January than in any month in the last 12 years, according to a Sacramento Bee review of data supplied by the U.S. Bureau of Reclamation.

With more rain and snow in the forecast, the pumps could stay at capacity for the next week or two. But pump operators probably will have to dial back because they're starting to run out of space in key reservoirs south of the Delta, said John Leahigh, who oversees day-to-day water management for the State Water Project, which delivers supplies to water agencies throughout California.

"This is definitely a 180 that we've done in terms of water supply," Leahigh said.

Increase in Delta pumping

The amount of water pumped each month from the Jones and Banks pumping plants in the Sacramento-San Joaquin Delta:



Source: U.S. Bureau of Reclamation

Thursday brought more news of California's progress against what has been a withering drought. Snow surveyors found a whopping 90 inches of snow at Phillips Station, a long-standing measuring spot near Echo Summit. That translates into 28.1 inches of "snow-water content," a leap of 22 inches in a month. The Phillips snowpack is at 153 percent of historical average and sits at its highest measurement for early February since 2005.

Frank Gehrke, the veteran Department of Water Resources official who runs the snow survey, said the strong results reflect the heavy precipitation that fell in January, which was "pretty much a banner month in terms of the snowpack."

Across the entire Sierra Nevada, the results were even more impressive: Snow-water content stood at 173 percent of historical average. Many spots have as much snow as they typically have on April 1, when the snow season peaks. A healthy snowpack means extra water becomes available in summer, when lawns and crops get thirsty in California's arid central and southern expanse and demand soars.

"Basically, a seasonal snowpack (is) already on the ground," Gehrke said. "And February and March quite often have very good storm activity."

With the exception of Folsom Lake, which is being kept below its historical average levels to meet flood-safety requirements, many of California's reservoirs are filling up quickly.

Leahigh said all the water gushing from the Delta pumps soon should fill San Luis Reservoir west of Los Banos – one of the largest reservoirs in the state and a linchpin of south-of-Delta water supplies. San Luis, which is twice the size of Folsom Lake, is 84 percent full and rising. Before long, it won't be able to take any more water, according to Leahigh. Almost all of its water is pumped in from the Delta.

The reservoir's ample supply is a remarkable turnaround from last summer, when San Luis plummeted to its lowest levels in a quarter century. Some Silicon Valley cities that draw drinking water from the lake feared shortages and warned customers of foul tastes and smells from the algae blooms forming on the lake's low, gunky surface.

Officials said the increased pumping stems in some part from a controversial water bill signed into law last year by then-President Barack Obama. The law directs operators of the Delta pumps to "maximize water supplies for the Central Valley Project and the State Water Project" by essentially shipping as much water south as is allowable under the Endangered Species Act.

But the primary reason so much water is being pumped is the vastly improved hydrological conditions in the Delta, particularly in the watersheds that supply the San Joaquin River. More than the Sacramento River, the flows on the San Joaquin are critical to how much water can be pumped.

"What is really driving the system is the amount of water flowing down the San Joaquin River into the Delta," said Doug Obegi of the Natural Resources Defense Council. He said pumping has been increased without violating protections for endangered fish.

The massive pumps in the south Delta, built decades ago along the San Joaquin side of the estuary, are so powerful that they can actually reverse the flows of key San Joaquin channels. That can draw smelt and other fish toward the pumps and predatory fish that await them at the intakes.

Last winter, storms brought powerful currents to the much larger Sacramento River. But pumping was nonetheless restricted because government biologists were concerned for the safety of endangered fish species that were migrating close to the pumps. That brought protests from south-of-Delta water agencies and their political supporters, including Sen. Dianne Feinstein, D-Calif., who said too much water was being allowed to flow to the ocean.

This year, the San Joaquin is running four times stronger than last year, more than enough current to counteract the powerful “reverse flows” generated by the pumps – even with both state and federal pumping facilities operating at full capacity, said Louis Moore, a spokesman for the U.S. Bureau of Reclamation, which operates the federal pumping plant.

“It is a totally different world than a year ago,” said Jason Peltier of the San Luis and Delta-Mendota Water Authority, one of the major suppliers of water to Silicon Valley and San Joaquin Valley farmers.

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Commentary: Fixing California water storage is not zero-sum game
East Bay Times | February 1, 2017 | Jill Duerig

In their recent commentary, “More dams won’t do it, time for a fresh approach on water,” the writers are spot-on in referencing the need for multiple solutions to solving California’s water challenges, especially in the face of anticipated climate change. However, they miss several important points about the value of new water storage in California.

Historically, California has used its snow pack as seasonal storage. With climate change, this immense natural water storage system will likely be significantly reduced or lost. Alternative water supply options are critical to maintaining a state that is economically and ecologically healthy.

Proposition 1, overwhelmingly approved by voters in 2014, was a clear signal that Californians support investing in new water storage, and for good reason. Prop. 1 will fund only the portion of storage projects that have a public environmental benefit. This funding mechanism creates a unique opportunity to use water to improve ecological conditions and water quality in important river channels and in the Sacramento-San Joaquin Delta (Delta), where the hub of our state’s water supply is located.

Under Prop. 1, at 50 percent participation, the state could have more than 200,000 acre-feet of dedicated water to use for the environment. That’s a significant public benefit.

Obviously, conservation, leak reduction, recycled water and groundwater management are all important parts of a diversified water supply portfolio for the state. Along with storage, they are all part of the California Water Action Plan. But it is misguided to pit water supply strategies against each other.

They are not “either/or,” but intended to work together to improve reliability and resiliency. No single solution, alone, can fully meet the state’s water supply needs. Creative, new storage projects could provide the additional public benefit of environmental flows, addressing not only reduced water storage with the loss of snow pack, but also providing water to improve ecosystems during anticipated climate change.

In particular, the Sites Reservoir Project is a modern, innovative storage project that would provide a needed boost in water supplies to cities across California, including those served by Zone 7, while balancing the environmental needs of the Delta.

Overwhelming supported by local, state, and federal agencies, the off-stream reservoir will not dam an existing river or block fish migration on the Sacramento River, and could be filled from just one or two major storm events, even during dry years.

The project would also help other Northern California reservoirs — Shasta, Trinity, Folsom and Oroville — by providing an additional 1.12 million acre-feet of critical water storage that could be stored later into the summer months, when it’s needed most.

In fact, had Sites been operational during the most recent winter storms, an additional 585,000 acre-feet of water would have been available, as of Jan. 17, for California homes, farms and businesses.

Zone 7 Water Agency continues to proactively seek ways to enhance storage flexibility, diversify its water supply portfolio and improve long-term water supply reliability for the Livermore-Amador Valley. As one component of this effort, Zone 7 has decided to participate in Phase One of the Sites Reservoir Project after finding that the project provides both environmental and water supply benefits to the Valley.

At the same time, we are moving forward with many other components of a diversified local water supply portfolio.

The California Water Action Plan, Proposition 1 and the Sites Project all represent a forward-thinking strategy to creating efficient, flexible new water storage. It is precisely the “fresh approach on water” that the writers seek, and California needs. The people of California are looking for a smart way to protect the environment and guard against future drought conditions. The Sites Project is a viable project that does both.

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Jill Duerig is general manager of Zone 7 Water Agency.

As it rains, state considers continuing drought rules

Board must decide whether to extend or modify the current regulations by the end of February

The Almanac | February 1, 2017 | Barbara Wood

The state's water board staff has recommended the extension of current regulations on water use that expire at the end of February. This photo shows a lawn suffering from water cut backs at Corte Madera School in Portola Valley in 2015. Almanac file photo.

It may be difficult to think about conserving water as the rain continues to pound down, causing mudslides and flooding in some areas, but the California State Water Resources Control Board is considering keeping water use restrictions in place because, despite the rain, the drought may not be over.

The state water board must decide whether to extend or modify the current regulations on water use before they expire at the end of February.

The water board's staff has recommended extending the current regulations, which require water companies to develop their own conservation plans and goals based on their supplies, and to report usage monthly.

Water uses that are considered wasteful, such as using sprinklers within 48 hours of rain or having water features that don't recycle water, are currently prohibited.

In a statement, the water board says water supply conditions, based on precipitation plus reservoir and snow pack storage, are better than they have been for the last several years. "However, we are only halfway through the traditionally wet period of the year. History shows that rains can stop suddenly and not return," the board says.

Restricted uses of water currently in effect are:

- Applying water to outdoor landscapes that causes runoff onto adjacent property, non-irrigated areas, private and public walkways, roadways, parking lots, or structures
- Using a hose to wash motor vehicles unless the hose is fitted with a shut-off nozzle or device that causes it to cease dispensing water immediately when not in use
- Applying water to driveways and sidewalks
- Using water in a fountain or other decorative water feature, except where the water is part of a recirculating system
- Applying water to outdoor landscapes during and within 48 hours after measurable rainfall
- Using potable water to irrigate outside of new construction without drip or microspray systems
- Using potable water on street medians
- Filling or refilling ornamental lakes or ponds except to sustain existing aquatic life
- Customers must fix leaks within their control within five business days of notification
- Hotel/motel operators must provide option to not have towels or linens laundered daily during a guest’s stay, and must provide clear notice of this option in easy-to-understand language
- Restaurants and other eating and drinking establishments may only serve drinking water upon request.

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For tax raisers, end of drought is bad news
Sierra Star | February 1, 2017 | Jon Coupal, Guest Commentary

As I write this, it is raining in Sacramento. Pouring, actually. And even though I live about 200 yards from the Sacramento River, I have confidence that the levees within the city limits are in good shape. (As well they should be given that Sacramento's flood control agency collects millions of dollars from local property owners annually to keep them maintained).

In a word, California is wet. Rain totals and snowpack measurements are the highest we've seen in about a decade. But despite the fact that flood gates at major dams throughout the state are now open, levies have been breached and there is serious flooding in both Southern California and the Central Valley, the State Water Resources Control Board refuses to declare the drought over.

As taxpayer advocates in a high tax state, we're accustomed to seeing a political motivation in most statements coming from government. But this time, we're not alone. Local water officials gave the State Water Resources Control Board an earful last week about the failure to call the drought over. A representative of the California Water Association, an organization comprised of local water districts, noted that the Yolo Bypass (designed to prevent flooding in Sacramento by releasing vast amounts of water into uninhabited farm land where it eventually flows back into the delta) now "looks like Lake Michigan." But state water officials were not persuaded and decided to keep the draconian drought regulations in place "for a few more months."

So are state officials being overly prudent? Even if they have the best of intentions, they are losing credibility by claiming that a "drought emergency" still exists. But what if the intentions of some state politicians – including the governor – are not so noble?

Back when the drought was real, there were calls by the governor that certain constitutional protections for taxpayers were preventing the state from dealing with the crisis. Proposition 13's voter approval requirements as well as Proposition 218's "cost of service" water rate limitations were the targets of complaints. Indeed, after a Court of Appeal decision over the summer upheld Proposition 218's commonsense requirement that water rates had to reflect the true cost of providing the water to water users, Governor Brown lashed out claiming that this deprived him of any tools to deal with the water shortage. (This was nonsense, as nothing in Propositions 13 or 218 took away an array of tools available to local governments to incentivize conservation and disincentivize waste).

The real problem for the politicians and bureaucrats is that if the drought is truly over, which common sense tells rain soaked citizens that it is, then this removes one more justification for repealing or weakening those laws designed to prevent governmental overreach.

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Jon Coupal is president of the Howard Jarvis Taxpayers Association — California's largest grass-roots taxpayer organization dedicated to the protection of Proposition 13 and the advancement of taxpayers' rights.

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Saving Water Is on Trend in the Apparel Industry

A few powerhouses are leading efforts in the fashion industry to be more water smart in every part of their supply chains. The rest of the industry needs to catch up, writes Ceres' Kirsten James.

Water Deeply | January 31, 2017 | Kristen James

It takes about three years' worth of drinking water to make your favorite cotton T-shirt using conventional manufacturing practices. That's roughly 713 gallons (2,700 liters).

The fashion industry's dependence on water is nothing new: From growing cotton to manufacturing textiles, water is an essential component throughout the fashion supply chain.

In recent years, however, the fashion industry has been making huge strides on water stewardship. From conducting life-cycle assessments on key products to innovating water-less dye processes to pledging to use organic cotton, many notable apparel juggernauts have begun implementing best practices throughout their waterlogged supply chains.

And with every season, more and more fashion houses are diving into the challenge.

Last month, I visited New Fashion Products' Los Angeles facility and saw firsthand how some of the leaders in the fashion world are rising to the challenge of making their clothing more water smart. New Fashion Products is an apparel manufacturer for some of the most influential names in the denim industry, including EILEEN FISHER, Levi Strauss & Co. and Patagonia.

My hosts for the visit – Shona Quinn, sustainability leader at EILEEN FISHER and Bobby Ahn, president and CEO at New Fashion Products – literally walked me through the process to make your favorite pair of jeans. From the design room to the textile warehouse, to the washing process, they described how water use comes into play at each step. We even hiked up to the roof to see the 0.6-MV solar array that produces 80 percent of their energy use. It never occurred to me just how much effort – and how much potential water – goes into crafting each pair of jeans.

Working with denim, a material that typically needs to be washed up to six times to get the right feel and coloring, the New Fashion Products team has explored – with the urging of clients like EILEEN FISHER – several ways to reduce water use. The facility has experimented with enzymes that can decrease the number of washing cycles over time as well as using ozone machines that bleach garments without water entirely. More recently, New Fashion Products has moved to machines with formaldehyde-free resins to limit water pollution.

New Fashion Products and its environmental values are part of a bigger fashion movement toward water stewardship. For EEILEEN FISHER, Levi's and Patagonia, being clients of the facility is only one facet of their action-driven work toward better water management across their supply chains, both through company strategies and industry collaborations.

From the field, to the factory, to the policy table, EILEEN FISHER has become one of the industry leaders in sustainability. The label is renowned for its long-standing commitments to the environment and has advocated for progressive policies at the local, state and federal level for years.

In 2015, EILEEN FISHER introduced Vision2020, a campaign that aims to scrutinize and improve the brand's practices. As part of Vision2020, EILEEN FISHER committed to using water in an environmentally responsible manner throughout its operations and supply chain. The brand has

already been using 20 percent less water in their Bluesign-certified dyehouse in China and plans for all its cotton and linen to be organic by 2020.

One of EILEEN FISHER's biggest goals, however, is to inspire others in the fashion industry to reconsider how they do business.

Another pioneer, Levi Strauss & Co., led the industry's first comprehensive life-cycle assessment for one of their core products, 501 jeans. Using that original assessment as its guide, Levi's sourced 12 percent of their total cotton through the Better Cotton Initiative in 2015 and has since launched a goal to use 100 percent sustainable cotton in its products by 2020. The denim giant also began its Water<Less campaign in 2011, which uses finishing techniques that can save up to 96 percent of water used in the denim finishing process. They introduced New Fashion Products to this technique in addition to other vendors. The company is also open sourcing these technologies in the spirit of collaboration and the sustainability of the industry as a whole.

Patagonia has also turned the tides on its water stewardship journey. The clothing company has set out to reduce the environmental impact of its supply chain through initiatives such as its Chemical and Environmental Impacts Program (CEIP), which covers areas such as chemicals management and water use in its global supply chain. In 2007, Patagonia became the first brand to join the network of Bluesign system partners and as of spring 2015, 56 percent of the company's fabrics are Bluesign approved. This rigorous certification eliminates hazardous chemicals in manufacturing, ensuring that the products sold are safe for people and the environment.

In addition to their individual work on water stewardship, EILEEN FISHER and Levi's are partners of Ceres through Connect the Drops, a campaign elevating the voice of California businesses in favor of resilient water solutions at both the local and state levels. All three companies are members of Businesses for Innovative Climate and Energy Policy (BICEP), a coalition that works directly with key allies in the business community to pass meaningful energy and climate change legislation, which is very intertwined with water issues.

Even companies like EILEEN FISHER, Levi's and Patagonia still have work to do to become 100 percent sustainable in their water practices and beyond, but their progress cannot be denied. In an industry that is parched, leaders have emerged that have the opportunity to not only change their company practices, but inform and transform the fashion world as a whole.

And back in Los Angeles, New Fashion Products' clients make sure to keep the facility honest about its water stewardship. All companies perform audits of the manufacturing facility's best practices, including energy and water. Ahn says this process makes him more aware of how to do business and drive progress forward, "As a collective, it makes us better."

Looking good and doing good are no longer mutually exclusive. The apparel industry needs to continue on a path toward sustainable water stewardship or risk being left high and dry.

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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State water project allocation increased
Sierra Star | January 26, 2017

As winter storms continue to fill reservoirs and boost the snowpack, the Department of Water Resources (DWR) increased its estimate of this year's State Water Project (SWP) supply from 45 to 60% of most requests.

"Our water supply outlook is definitely brighter, but we still haven't shaken off the effects of our historic drought," said DWR Acting Director William Croyle. "Californians in some areas still depend on bottled drinking water, some reservoirs remain low and groundwater basins are still in decline and have yet to recover. We know from painful history that California winters can go quickly from very wet to very dry. We want to see the snowpack continue to build for the remainder of the wet season."

DWR initially estimated it would be able to deliver only 20% of the 4.1 million acre-feet of SWP water requested this year. That projection (allocation) was increased to 45% as reservoirs rose from December storms. The increase to 60% of collective delivery requests is due to the atmospheric river storms that have filled many reservoirs and brought flood waters to some areas. With more rain and snow in the forecast, DWR hopes it will be able to increase the allocation further.

Shasta Lake north of Redding, California's and the federal Central Valley Project's (CVP) largest reservoir, was holding 3,640,765 acre-feet, 80% of its 4.5 million acre-foot capacity and 123% of its historical average. San Luis Reservoir, a critical south-of-Delta pool for both the SWP and CVP, was holding 1,480,803 acre feet, 73% of its 2 million acre-foot capacity and 98% of its historical average for the date.

As State Water Project allocations change, it is important to remember that nearly all areas served by the project also have other sources of water, among them streams, groundwater and local reservoirs.

DWR's California Data Exchange Center websites show current water conditions at the state's largest reservoirs and weather stations.

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Drought or not, water conservation must remain the norm
Sacramento Bee | January 26, 2017 | Editorial Board

After five years of drought, California is in the midst of one of the wettest years on record.

The Sacramento River is swollen, the Yolo Bypass looks like a lake, Sierra snowpack is accumulating and large reservoirs are filling. And as inevitably happens when rain falls, local water agencies, San Diego's among them, are calling on the state to lift restrictions on water use.

But the rainy season doesn't end until April. Whether it keeps raining or not, April would be soon enough to make a declaration one way or another. Even if Gov. Jerry Brown does declare an end to the drought, the next dry spell could be upon the state before we know it. In part because of climate change, in part because of greater demands on water, Californians must not go back to water-wasting ways.

Most of the state, particularly where most people live, is perennially dry, and much of it is desert. With global warming, weather patterns will change and this state of almost 40 million people must adapt. By 2100, sea levels are predicted to rise by 17 to 66 inches, and "the frequency of extreme events such as droughts, heat waves, wildfires, and floods is expected to increase," the Public Policy Institute of California, a nonpartisan independent think tank, said in a recent report.

As the mercury rises, more precipitation will fall as rain rather than snow, and the snowpack, upon which California long has depended, will diminish. That likely will increase the "frequency and magnitude of flooding and diminish water reserves in the Sierra," the PPIC report said. Even if all greenhouse gas emissions ended today, "some of these changes would be unavoidable because the climate system changes slowly."

Although California's largest reservoirs are filling, one in Santa Barbara County is at only 11 percent of capacity. Groundwater, which kept many Central Valley orchards alive during the drought, has been depleted. As the PPIC said: "One wet year is not a drought buster. ... It would take many successive wet years – and more intentional groundwater capture and storage – to restore aquifers to the condition they were in before the onset of drought."

Many people in Southern California are to be commended for their conservation efforts. The San Diego Water Authority, in particular, has added storage, built a desalination plant and persuaded homeowners to dramatically reduce use. With the rain that has fallen so far this season, it's understandable that on Thursday, the authority urged the state to act in February to lift emergency conservation requirements.

But the Brown administration would be wise to wait to make any such declaration until at least April. And even if the five-year drought is over, water recycling and conservation must become second nature for Californians.

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