

NEWS CLIPS

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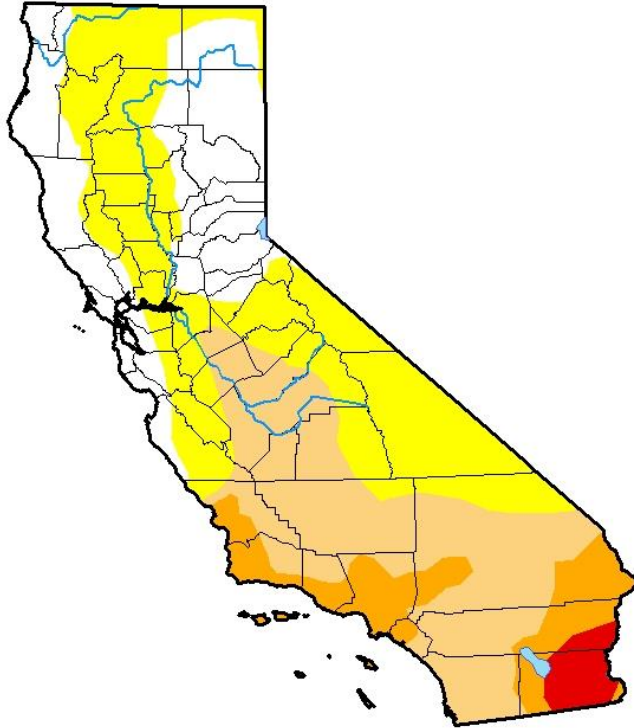


Resource Conservation and Public Outreach

Organized by date

U.S. Drought Monitor California

March 27, 2018
(Released Thursday, Mar. 29, 2018)
Valid 8 a.m. EDT



Drought Conditions (Percent Area)

	None	D0-D4	D1-D4	D2-D4	D3-D4	D4
Current	22.99	77.01	40.77	12.56	2.50	0.00
Last Week <i>03-20-2018</i>	11.08	88.92	47.68	22.31	0.43	0.00
3 Months Ago <i>12-26-2017</i>	55.70	44.30	12.69	0.00	0.00	0.00
Start of Calendar Year <i>01-02-2018</i>	55.70	44.30	12.69	0.00	0.00	0.00
Start of Water Year <i>09-26-2017</i>	77.88	22.12	8.24	0.00	0.00	0.00
One Year Ago <i>03-28-2017</i>	76.54	23.46	8.24	1.06	0.00	0.00

Intensity:

- D0 Abnormally Dry
- D1 Moderate Drought
- D2 Severe Drought
- D3 Extreme Drought
- D4 Exceptional Drought

The Drought Monitor focuses on broad-scale conditions. Local conditions may vary. See accompanying text summary for forecast statements.

Author:

Chris Fenimore
NCEI/NESDIS/NOAA



<http://droughtmonitor.unl.edu/>

Late Sierra Nevada snow rivals 1991's 'miracle'

ASSOCIATED PRESS

Ventura County Star 3/30/2018

RENO, Nev. – A series of late winter storms rivaling the “Miracle March” of 1991 has bolstered an otherwise dismal season of snowpack in the northern Sierra.

The Reno Gazette Journal reported Monday that snowpack in the Lake Tahoe area grew from 25 percent to 73 percent between March 1 and March 25.

In 1991, the Tahoe basin snowpack was at 15 percent of median on March 1 but by March 25 had reached 74 percent.

In terms of water volume, storms from March 1 through Sunday this year added 10.6 inches of water to the snowpack on average at stations across the Tahoe basin. In March of 1991, that number was 12.3 inches.

The story was similar throughout northwestern Nevada. Across the Tahoe, Truckee, Carson and Walker river basins the March snowpack as a percent of normal shot upward.

The winters of 1991 and 2018 were remarkably similar. Skiers and snowboarders suffered through historic or near-historic lack of snow from late December well into February before things turned around later than anyone expected.

“It is amazing how closely these two years have tracked,” said Jeff Anderson, a hydrologist for the Natural Resources Conservation Service, which operates automated measuring stations. “It is almost like there was a replay button, we’ll just do 1991 again this year.”

Through Monday, this year was the fifth biggest March on record in the Tahoe Basin in terms of snowpack growth.

The four Marches ahead of 2018 on the list, excluding 1991, weren’t dubbed “miracles” because it was already snowy when they started so the region didn’t need an improbable snowpack increase to reverse a historically dry winter in the waning weeks.

And even though 2018 fell short of 1991 it was enough for some to declare it miraculous.

“I think it is safe to officially call it a Miracle March,” said Chad Blanchard, the federal water master in Reno. His job includes monitoring water levels in Lake Tahoe, the Truckee River and associated reservoirs such as Boca and Stampede.

The system is the source of water for Reno and the Truckee Meadows, which means it’s a shared source of water for drinking, farming, species preservation and recreation.

“It has been an incredible turnaround,” Blanchard said. “A week and a half ago it didn’t look like we were filling anything. Now it appears we will be able to fill every reservoir.”

Although the late-season storms delivered a welcomed shot of snow it's important to note that, unlike winter of 2016-17, the region is likely to enter the spring with less snowpack than normal.

"We've been emphasizing this March has been really great and important, but April 1 is likely going to end up in a drought category," said Dan McEvoy, a climatologist at the Western Regional Climate Center. "Don't overlook that."



Children race down a ski run at the Sierra-at-Tahoe Ski Resort near Echo Summit on Feb. 1.
RICH PEDRONCELLI/AP FILE

Southern California blooming after rains

Flowers haven't reached scale we saw last year

Cheri Carlson USA TODAY NETWORK

Ventura County Star 3/30/2018

Hillsides painted in orange, white and violet blooms took over the Santa Monica Mountains last year.

Flowers blanketed the Channel Islands off Ventura. Huge crowds flooded a bright orange poppy preserve near Lancaster, and a San Diego County state park set up a wildflower hotline to field calls.

After five years of drought, a wet December 2016 doused Southern California a storm or two at a time — ideal conditions for a super bloom.

“This time last year, I was telling people to get out to see the flowers,” said Joey Algiers, a restoration ecologist with the National Park Service.

But then the rain stopped. Ventura County and much of Southern California were on track for one of the driest years on record. That is, until a few weeks ago.

March turned out to be much wetter than normal. While it wasn't a drought-buster, it just might save wildflower season.

Algiers said he's holding out hope for late bloomers and telling people to hang on a little bit longer.

“What was looking like a bad year for wildflowers could turn around,” he said.

A season of brightly colored fields might peak in mid- to late April.

Last year, the super bloom had peaked and was fading by the end of March, according to the Thomas Payne Foundation for Wildflowers and Native Plants.

“This year, we are still waiting for any kind of bloom,” its annual spring wildflower hotline said. “Reports are hopeful for at least a moderate bloom in April and May. Timing is everything when it comes to our California wildflowers.”

This year, the weather threw some curves.

“We had a little bit of a weird season,” Algiers said.

Winter months started off warm and dry and then came a cold spell and some frost — not good for blooms.

In the Antelope Valley, the poppy reserve posted a message on its website saying some buds were making an appearance.

In a couple of weeks, the popular spot might see a small to moderate bloom.

Rainfall in Ventura County sits around half of normal. It's too soon to say whether it's too little too late.

“I think it’s unlikely that we’ll see anything like what we saw last year,” Algiers said. “We could see some spots that see some nice blooms.”

In the meantime, flowers are blooming. They just might be a little harder to spot from far away.

In the Santa Monica Mountains, volunteers reported seeing blue dicks, morning glories, woolly paintbrush and some poppy species popping up near trails.

Algiers suggested Rancho Sierra Vista in Newbury Park, Malibu Creek State Park in Calabasas, or the China Flat area in Cheeseboro Canyon in Agoura Hills.

To find about the wildflower bloom before you visit, call the Santa Monica Mountains visitor center at 3702301.

Reports are added on Fridays to the Theodore Payne Foundation’s spring wildflower hotline at 818-7681802, ext. 7.



Joseph Algiers, restoration ecologist with the Santa Monica Mountains National Recreation Area, looks at wildflowers in bloom at La Jolla Canyon Trail at Point Mugu State Park. Flower season might peak in mid- to late April. JUAN CARLO/THE STAR

PUBLIC SAFETY BRIEFS

Public warned to avoid water at 6 Ventura County beaches

Public health officials are warning beachgoers to avoid six Ventura County beaches after water samples failed to meet state standards for bacteria.

Affected areas in and near Ventura include Emma Wood State, Faria County Park, Promenade Park, Rincon and Solimar beaches. Channel Islands Harbor Beach Park in Oxnard also failed, according to the Ventura County Environmental Health Division.

Health officials said they posted warning signs telling visitors that contact with ocean water should be avoided for a minimum of 50 yards on either side. The signs will remain posted until ocean water quality meets state standards.

Items that may have come in contact with ocean water should be avoided, and if they do contact the water, the items should be washed thoroughly with soap and water.

Also, shellfish on or from the affected Ventura County beaches may have also been exposed to this contamination and should not be eaten.

Results for specific beaches are available on the Environmental Health Division's recorded hotline at 805662-6555, online at www.vcrma.org/divisions/environmental-health or on the VC Safe Beaches app.

Ventura County Star 3/29/2018

Soil outside Fillmore off EPA list

Groundwater at old refinery site is still a Superfund project

Tony Biasotti USA TODAY NETWORK

Ventura County Star 3/28/2018

The Chevron property just east of Fillmore — once an oil refinery and soon to be a solar farm — has been partially removed from the list of the U.S. Environmental Protection Agency's top-priority hazardous waste cleanup sites.

The EPA announced Monday that it had removed the soil portion of the site from the Superfund cleanup program. The groundwater under the property remains a Superfund project, and Chevron is in the early years of a multi-decade process to clean it of benzene, a cancer-causing chemical. The EPA does not consider the groundwater to be a threat to anyone's health, because it is far from any source of drinking water.

The site was a Texaco refinery and pumping station for most of the 20th century. It entered the Superfund program in the 1990s. Chevron bought the property when it acquired Texaco in 2001.

Contractors hired by Chevron and overseen by federal and state environmental officials finished cleaning up the soil in 2014 by burying contaminated dirt deep underground and covering it with multi-layered caps, topped with concrete.

The EPA will still inspect soil at the site every five years to make sure it's still free of lead and other contaminants left by decades of oil processing, and the water cleanup will continue.

"We have a lot of data, and this puts it into one concise package telling the world this site has been cleaned," said Holly Hadlock, the EPA's project manager for the site. "It means EPA has no more work it's going to require the responsible party to do."

For Chevron and Cenergy Power, the company leasing the property to build a solar field, the "partial deletion" eases the path toward completing that project.

Chad Chahbazi, Cenergy's director of project development, said Cenergy plans to break ground on the Fillmore field in August or September. The Ventura County government has agreed to buy the power the company generates, which should amount to about 3.6 megawatts.

If the soil were still an active Superfund cleanup, it might be difficult for Cenergy to insure the project, Chahbazi said. The partial deletion should remove any doubts that insurers or anyone else would have about whether workers will be safe on the property, he said.

"We're not doing anything with the groundwater — we're just putting solar into the ground — so all we need is for the soil to be cleaned up," Chahbazi said.

The Ventura County government and city of Fillmore both supported the partial deletion. Hadlock said the EPA received seven written comments on the matter, and five were in favor of the partial deletion.

The two people who were opposed were Fillmore residents who were worried about being exposed to dangerous chemicals. Hadlock said that won't happen because the contaminated soil is securely buried. If tests detect lead or other contaminants again, the EPA can make Chevron do more cleanup without having to go through the process of relisting the soil in the Superfund program, Hadlock said.

The cleanup of the groundwater will take decades, as Chevron sucks benzene-contaminated vapors out of groundwater wells. When the groundwater cleanup began in 2011, the EPA estimated that it would take around 50 years. It is ahead of schedule so far, Hadlock said, because the drought has lowered the water table.

A strong tunnel vision? Two delta tunnels, one or none?

The decision to build one giant waterway under the Sacramento-San Joaquin Delta does little to settle the fate of a project vital to both agricultural and urban interests



ANGLERS fish in the San Joaquin-Sacramento River Delta near Courtland, Calif. Money is the key to WaterFix, a priority of Gov. Jerry Brown that has been in the planning stages for more than a decade. Despite downsizing, the project remains massive. (Photographs by Rich Pedroncelli Associated Press)

By Bettina Boxall
LA Times 3/25/2018

Two tunnels, one or none? The question continues to swirl around plans to perform major surgery on the sickly heart of California's water system.

Confronted with a shortage of funding, state officials announced last month that they would move ahead with the construction of one giant water tunnel under the Sacramento-San Joaquin Delta instead of two.

But the announcement did little to settle the fate of the project, which Gov. Jerry Brown's administration considers vital to sustaining water deliveries to one of the country's richest agricultural regions and the urban sprawl of Southern California.

Opponents still don't like the so-called WaterFix plan, which despite downsizing is massive. Financing remains an open question. And backers haven't given up their dream of two 35-mile tunnels carrying high-quality Sacramento River water under the delta's levee-ringed farm islands to government pumping plants that fill southbound aqueducts.

"We're being sent down a lot of rabbit holes, and we don't know which one's got the rabbit," said Jonas Minton, a former state water official who is on the staff of an environmental group.

Money is the key to WaterFix, a priority of Brown's administration that has been in the planning stages for more than a decade. Underlying that is the fundamental question of the tunnels' value to California's water supply.

The \$17-billion bill for the twin-tunnel version was supposed to be paid by the San Joaquin Valley agricultural districts and Southland urban agencies that rely on water deliveries from the southern part of the delta. But the farm districts have for the most part declined to open their wallets, saying the tunnel water is too expensive for them.

That prompted the Brown administration's decision to press ahead with a less-expensive, one-tunnel project. But as the state continues to try to round up enough financing for the scaled-down proposal, the Metropolitan Water District of Southern California is pondering whether to ride to the rescue of the full project.

There is no formal proposal on the table, but the MWD staff is exploring the possibility of the district picking up WaterFix's unfunded portion and building both tunnels.

If that happened, the water wholesaler's tunnels tab would soar to roughly \$11 billion, more than double the \$4.3 billion the district board approved last fall.

The ever-shifting plans have intensified debate over the size and need for WaterFix.

Environmental groups argue the billions that will eventually come out of ratepayers' pockets would be better spent expanding regional supplies such as recycled water and stormwater capture.

"Those projects would actually produce new sources of water," said Brenna Norton, the Southern California organizer for Food and Water Watch.

One tunnel with two river intakes would accomplish much of what water agencies hope to gain with a bigger project, said Jeffrey Mount, a water policy expert at the Public Policy Institute of California.

"We've said this repeatedly: One tunnel performs almost as well as two tunnels," Mount said. "There is a substantial amount of cost associated with the second tunnel, and it is unclear to me that that creates sufficient benefit to warrant it."

State officials say WaterFix is necessary to sustain delta deliveries in the face of tightening environmental restrictions, rising sea levels and the potential for a large

earthquake that could topple delta levees that keep seawater from contaminating water exports.

Without the project, the state Department of Water Resources predicts delta exports over time will decline by about a fifth, to roughly 1970s levels.

The tunnel project is intended to lessen the ecological effects of the state and federal pumping operations that draw directly from the delta's southern portion.

The monster pumps are so powerful that they force water channels to run backward, draw the native delta smelt into bad habitat, confuse migrating salmon and upend the natural flow patterns of the estuary system.

Regulators have responded by clamping down on pumping to cap the reverse flows.

By partly supplying the pumps with tunnel water diverted from the Sacramento River in the delta's northern reach, WaterFix is designed to reduce direct withdrawals from the southern delta — and thus head off more pumping restrictions.

But the tunnels won't give the ailing delta and its vanishing native fish what biologists say the estuary system needs most: a lot more fresh water flowing into the delta and out to sea.

"I basically accept the fact that the water is going to go south and to the Bay Area no matter what ... that's the political reality," said Peter Moyle, a UC Davis fisheries professor emeritus whose research helped put the once-abundant delta smelt on the federal endangered species list more than two decades ago.

Given that Moyle doesn't expect the delta to get the flows it needs, he says WaterFix could alleviate some of the negative pumping effects. "When you look at all the alternatives, it's the main one that's out there that is a real alternative for management of the system in a way that can benefit fish."

Environmental groups have consistently argued that constructing two tunnels — each taller than a three-story building — would inevitably invite exporters to pull ever more water out of the delta, despite their assurances to the contrary.

"Once these are constructed, the operations will be subject to whatever the politics of the day are," said Minton, senior water policy advisor at the Planning and Conservation League. "It's like giving a teenager the keys to a 400-horsepower Mustang car and telling them only to drive at 60 miles an hour."

Minton's organization and several other groups previously asked the state to consider paring the project to one river intake and one small tunnel, coupled with substantial investments in developing regional water supplies.

That didn't happen. The two-intake, one-tunnel version the state is now proposing would cost \$11 billion, a third less than the twin tunnels, and have a capacity of 6,000 cubic feet per second, also a third less than the two-tunnel proposal.

Because more diversions would have to come directly from the south delta if only one tunnel is constructed, “the benefits of the project drop” as well, said MWD assistant general manager Roger Patterson.

According to an MWD analysis, overall tunnel supplies would decline by a third, and there would be some reduction in water quality improvements and some increase in harmful reverse flows compared with two tunnels.

Still, one key number would not change. Overall State Water Project deliveries to MWD and other state contractors that invested in WaterFix would be roughly the same whether one or two tunnels are built.

So why would MWD take on billions more in debt to build a bigger project that wouldn’t increase deliveries to its urban customers?

MWD officials say the extra capacity could be used to convey water that the agency sometimes purchases in addition to its State Water Project allocation. And it would give water managers more flexibility in how they run the pumping operations.

The agency also assumes that San Joaquin agricultural districts that don’t want to invest in upfront tunnel costs would be interested in buying tunnel capacity once the project is up and running.

“Will there be buyers in the future that would be willing to pay for that?” Patterson asked. “There’s a good chance there will be.”

If the tunnels aren’t built and delta exports drop as the state predicts, the San Joaquin Valley growers who are holding out on paying for WaterFix will suffer the most.

That’s because California’s new groundwater law will in coming years force farmers to stop overpumping the valley aquifer — their fallback in times of drought and low allocations from the federal Central Valley Project.

“These are very shrewd businessmen and women,” Mount said. “They also know full well that this is a negotiation that’s going on. If you don’t have enough money to build the whole project, we’re going to hold out and see if we can get someone else to pay for it.”



A SIGN opposing the proposed Sacramento-San Joaquin Delta tunnel plan is displayed in a yard near Freeport, Calif., in 2016. RICH PEDRONCELLI ASSOCIATED PRESS

California's flooding 'nightmare' A flood that could dwarf Big One

State's history demonstrates how catastrophic rainstorms can be

By Rong-Gong Lin II
LA Times



Los Angeles Times

FLOODWATERS flow through the streets of Venice after a storm. This photo was originally published in the March 4, 1938, edition of the Los Angeles Times.

California's drought-to-deluge cycle can mask the dangers Mother Nature can have in store.

During one of the driest March-through-February time periods ever recorded in Southern California, an intense storm dumped so much rain on Montecito in January that mudflows slammed into entire rows of homes. Hundreds of homes were damaged or destroyed, and at least 21 people died.

It was a grim reminder that in a place so dry, sudden flooding can bring disaster.

Eighty years ago this month, epic storms over just six days caused widespread destruction across Southern California. Rain fell as fast as 2 inches in a one-hour period. Wide swaths of the San Fernando Valley were inundated; floodwaters in the Los Angeles River mowed down bridges and pulled apart railroads.

Government officials responded with a major flood-control campaign, building dams and deepening rivers and lining them with concrete to flush water out to sea before floodwaters could rise. But even those protections have limits. And history shows there is precedent for more devastation.

Several weeks of monumental storms would be all it would take to overwhelm California's flood-control system and cause widespread flooding and destruction.

Overwhelming the state's flood system

Take the heavy rains from the winter of 2016-17 — which poured over a period of 80 days — and compress them down to fall in 23 days: California would experience a flood event so grave it would overwhelm the state's flood-control systems, force 1.5 million people to evacuate, and cause economic damage that could total \$725 billion .

“Really, a major flood like this would dwarf a 7.8 earthquake in Southern California” in terms of the financial toll, said Dale Cox, project manager for the U.S. Geological Survey's Science Application for Risk Reduction. (A magnitude 7.8 earthquake is expected to cause \$213 billion in economic damage.)

“The storm is estimated to produce precipitation that in many places exceeds levels only experienced on average once every 500 to 1,000 years,” the report said.

And as the situation from Hurricane Harvey in Houston showed, once-in-a-1,000-year storms can happen.

“Such an event could occur in any future winter,” the USGS said of a modern-day scenario similar to the historic 1861-62 floods that transformed much of the Central Valley and Los Angeles Basin into an inland sea.

The scenario was dubbed ARkStorm — named for Atmospheric River 1,000 Storm — and published in 2011 after input from more than 100 experts from public and private sectors.

The scenario envisions a pounding of California by a series of “atmospheric rivers” — long plumes of water vapor that can pour over the West Coast and hold as much as 15 times the liquid water flowing out of the Mississippi River's mouth.

Flooding submerged the Golden State

The Great Flood of 1862 occurred in a series of storms that lasted just 45 days, and plunged most of the Central Valley and Los Angeles Basin underwater.

Modern-day flood-control systems built in the 20th century have recently spared California from the kind of catastrophic flooding seen in the early days of statehood.

For instance, officials launched an ambitious project to protect California's capital, which was built where the American and Sacramento rivers met and struggled for decades with flooding since its founding.

One of the solutions was to set aside a massive area of farmland that transforms into an inland lake during the wettest years, designed as a relief valve to spare Sacramento from floodwaters.

But there is always the possibility that just the right set of circumstances meet to cause a rare but devastatingly powerful series of storms to head to California.

"It's inevitable that all of our flood-control systems, at one point, will be overwhelmed — because we only design for so much," said Keith Porter, a University of Colorado Boulder research professor and coauthor of the scenario.

Officials in state and local agencies agree that the USGS extreme flood scenario is one that could strike California.

"Yes, the ARkStorm is definitely a realistic scenario," said Michael Mierzwa, lead flood management planner for the California Department of Water Resources.

Mark Pestrella, chief of the Los Angeles County Flood Control District, agreed. "It's plausible," he said. "Many things would have to come together for that to happen."

Realistic doomsday option envisioned

The ARkStorm is modeled on merging two recent extreme California storms that could bring the kind of rainfall that struck in 1861-62. It combines the great Southern California storm of Jan. 19-27, 1969, back-to-back with the Northern California storm of Feb. 8-20, 1986, and what would happen if the first of those storms stalled over a 24-hour period.

"While history will not repeat itself in exactly this way," a summary of the ARkStorm scenario said, "a story resembling [an uninterrupted sequence] of these two events in terms of duration, windspeeds and precipitation is entirely realistic."

"Putting those two storms together was enough to exceed the flood capacity of most of the state," said scientist Lucy Jones, who coauthored the flood scenario report for the U.S. Geological Survey.

The 1861-62 flood was a seminal moment in California history. That flood was said to have forced the state's eighth governor, Leland Stanford, to row through floodwaters to his inauguration, and then back home to climb in through the second story.

Floodwaters covered a region of the Central Valley 250 to 300 miles long and about 20 to 60 miles wide, according to an account by geologist William Brewer and reviewed by

Jones for her book to be published in April, “The Big Ones: How Natural Disasters Have Shaped Us and What We Can Do About Them.”

In her book, Jones called the flood of 1861-62 “the most devastating event in California history” — superseding even the great 1906 San Francisco earthquake.

One-third of California’s taxable land was destroyed, Jones wrote, and the state went bankrupt — the Legislature wasn’t paid for 18 months. Entire industries were destroyed: mining equipment was swept from the mountains and many miners died, a factor in the end of the Gold Rush, Jones wrote; the ranching industry shrank as hundreds of thousands of heads of cattle, sheep and lambs drowned, and California progressed from a ranching economy to one focused on farming.

“Just trying to describe the extent of the damage is overwhelming,” Jones wrote. “Yet, 150 years later, most Californians are unaware that it ever happened.”

In Anaheim, the Santa Ana River swelled to become four miles wide, “creating an inland sea 4 feet deep that lasted for a month,” Jones said. The overflowing river wiped out the town of Agua Mansa near where Fontana is now — destroying what was once the largest settlement between L.A. and New Mexico.

“In Los Angeles, the water was described as extending from mountain to mountain, with no dry land between the Palos Verdes Peninsula and the San Gabriel Mountains,” Jones said.

A rain gauge near where Marina del Rey is today recorded 66 inches of rain falling in just 45 days, Jones said. That’s more than quadruple the average rainfall downtown L.A. sees in an entire year.

But those storms probably weren’t even the worst California has ever faced. Geologic data point to six mega-storms striking California in the last 1,800 years that were even worse than the 1861-62 storms, based on data collected in the San Francisco Bay and Santa Barbara areas, the report said.

And climate change could make such storms more likely in the future — “as the oceans heat up, that means more fuel for an ARkStorm.”

“California flood protection is not designed for an ARkStorm-like event,” the report said. “Levees are not intended to prevent all flooding, such as the 500-year stream flows that are deemed realistic throughout much of the state in ARkStorm.”

The ARkStorm could cause a flood 300 miles long and 20 or more miles wide in the Central Valley, forcing 1.5 million people to flee their homes. Sobering maps in the USGS report show much of Sacramento and Stockton underwater, which are both located next to California’s largest rivers, the Sacramento and the San Joaquin.

The scenario forecasts 50 breaches of the levees as being realistic. The scenario said officials' goals for the levees were to keep them intact long enough to assure safe evacuation — not to protect property.

L.A. probably would not suffer as widespread inundation as it did in the 1861-62 flood, Cox said. "But there would be quite a bit of flooding," he said.

According to the report, the lower reaches of the Los Angeles and San Gabriel rivers could spill their banks, turning sections of Long Beach, Carson, Lakewood, Compton, Downey and West Covina into flood zones. Coastal flooding could inundate areas such as Belmont Shore, Naples and Seal Beach and the ports of Los Angeles and Long Beach.

Northern Orange County could turn into a sea, with floodwaters covering Fullerton, Anaheim, Garden Grove, Santa Ana and Westminster all the way to the beach.

Silicon Valley could be hit hard. Wide swaths of Santa Clara County, such as Santa Clara, Mountain View, Cupertino, San Jose and Palo Alto, could be flooded. So could areas of San Mateo and Alameda counties, including Menlo Park, Foster City, San Mateo, Burlingame, Fremont and Newark.

Floods could also hit San Diego County.

All California counties could see some degree of flooding. Wastewater treatment plants could be damaged by floods, and sediment could get into pumps as they tend to be in low-lying areas. Untreated sewage could flood into and contaminate wells.

Hurricane-force winds of up to 125 mph could strike the mountains. The flooding would disproportionately affect cities, Porter said. "We estimated that 1 in 4 California buildings is touched by flooding," he said.

A big problem is how much of California is under-insured for economic losses from a rare flood event. Experts estimated that just 6% to 10% of the economic damages would be insured.

More can be done
to handle flood risk

Mierzwa, of the California Department of Water Resources, said more could be done to handle California's flood risk. State and local agencies spend \$30 million a year to maintain 1,600 miles of levees in the Central Valley; they should be spending \$130 million annually to meet current federal standards.

"It's like never paying to maintain your car," Mierzwa said. "So we're living with greater risk there." Also, he said, aging levees and reservoirs need to be replaced.

There are plans to make more room for rivers and create a new flood bypass — a dedicated zone of farmland that would protect Stockton when the San Joaquin River

reaches its flood stage. Once built, the state can flood that land in the wettest of years, keeping water away from homes as it winds its way to San Francisco Bay.

In Los Angeles County, flood-control officials say an urgent priority is emptying the flood-control reservoirs of mud and debris that protect the urban communities from floodwaters and fast-moving debris pouring from the San Gabriel Mountains.

The reservoirs are so full of debris that they pose an increased flood risk to the communities below them. The most urgent need is to remove dirt and debris behind Devil's Gate Dam in Pasadena, which officials have been warning about since at least 2011; under one possible scenario, torrential rains could send mud, rocks and water over the dam and flood the Rose Bowl, the 110 Freeway, Pasadena, South Pasadena and northeast Los Angeles.

Large-scale removal of the debris has not commenced, which could take three to five years to complete the clean-out. Some environmentalists have opposed the county's plan, saying less sediment should be removed, given the area is now home to trees and wildlife.

Two others that also need urgent debris removal are the flood-control reservoirs behind Big Tujunga Dam, which protects Tujunga, and Pacoima Dam, which protects Olive View-UCLA Medical Center, Sun Valley and Sunland. All three dams protect 2 million to 3 million people from flooding.