NEWS CLIPS

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Resource Conservation and Public Outreach

Organized by date

Will Las Virgenes reservoir spill in deluge? It's possible

CHERI CARLSON
Ventura County Star 2/17/2017

UPDATE: The district released a chart mapping the water level at the reservoir. Water will reach the spillway at 1,048 feet above sea level. As of 8:45 a.m. Friday, the water level fell just shy of 1,047 feet above sea level.

To watch video: http://www.vcstar.com/story/news/special-reports/outdoors/2017/02/16/local-reservoir-spill-storm-s-possible/97969172/

A Westlake Village reservoir may spill for the first time in more than 30 years during a storm that's expected to reach the area Friday.

The manmade lake, managed by Las Virgenes Municipal Water District, sits above Three Springs Park and the neighborhood that surrounds it.

Water came within a foot or so of the concrete spillway this week, prompting officials to spread word that a release could occur over the next few days.

"We want folks to know that they're safe," said Jeff Reinhardt, public affairs manager for the district that serves Westlake Village, Agoura Hills, Hidden Hills and Calabasas.

This is how the facility was designed to work, and officials said the dam is not at risk. "This is not Oroville," Reinhardt said. Authorities in the Northern California town announced last weekend that an eroding spillway at the Oroville Dam was at risk of failing. Several nearby communities were evacuated. At the local reservoir, there was no indication the system wasn't operating as it should, officials said. The primary difference: Oroville has a river flowing through it, while the local reservoir does not. "That's a huge difference. We don't have to manage the unknown inflow from an incoming stream, just the rain that falls in the reservoir and the watershed itself," Reinhardt said. Lake Oroville also is much bigger, with a storage capacity of more than 3 million acre-feet of water. The Las Virgenes reservoir capacity is about 9,800 acre-feet, said Carlos Reyes, the district's resource conservation director.

Nearly all of the water in the local reservoir is imported from Northern California — areas like Lake Oroville — through the State Water Project.

The reservoir provides a backup in case the area gets cut off from its imported water supply, and its reserves can be used during the summer, when water use typically is at its highest. "We try to keep it full through the winter months," Reinhardt said.

If needed, the water stored there can get the district through three to six months, he said. The reservoir, first filled in 1974, has never spilled, although it apparently came close back in 1992, Reyes said. Once water reaches the spillway, it would flow into a

concrete channel, down a steep hillside and into the park. From there, a concrete storm drain on the far side of the park would take water underground to a nearby lake.

Whether water breaches the spillway Friday or over the weekend depends on how much and how fast any rain falls and runs off nearby mountains.

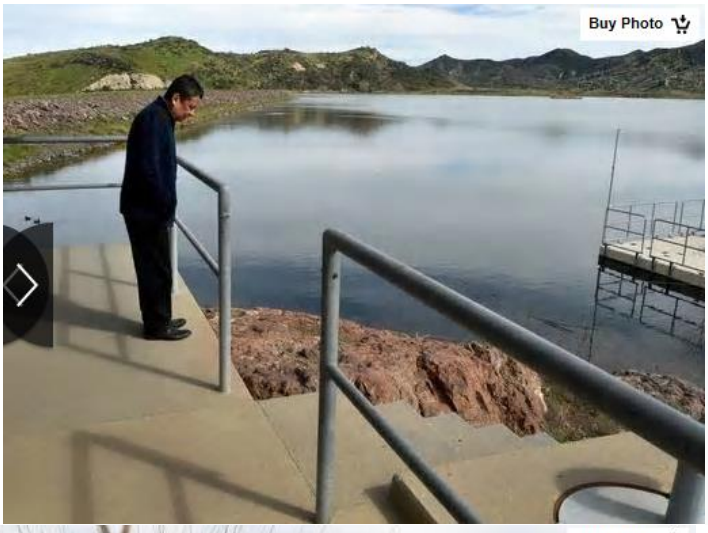
The forecast calls for 6 to 8 inches of rainfall in the area, which could be enough. In the meantime, officials said they plan to pump water out of the reservoir.

Because of recent upgrades, however, the treatment plant is offline. The new facilities need to be approved by public health officials, Reinhardt said. “We will not put the plant online until we’re confident it meets all drinking water standards,” he said. The district was able to release a small amount of water through an auxiliary line into the storm drain Thursday.

The Las Virgenes Municipal Water District reservoir in Westlake Village is near capacity as Ventura County prepares for an approaching rainstorm on Friday. A spillway in the dam will begin sending excess water to a nearby lake if the water level exceeds capacity. ANTHONY PLASCENCIA/THE STAR

Gallery: Las Virgenes reservoir close to spilling

The Las Virgenes Municipal Water District reservoir in Westlake Village is near capacity as Ventura County prepares for an approaching storm. ANTHONY PLASCENCIA/THE STAR



Gallery: Las Virgenes reservoir close to spilling

Carlos Reyes, director of resource conservation and public outreach at Las Virgenes Municipal Water District, looks at the district's nearly full reservoir in Westlake Village on Thursday. ANTHONY PLASCENCIA/THE STAR

Gallery: Las Virgenes reservoir close to spilling

The Las Virgenes Municipal Water District reservoir in Westlake Village is near capacity as Ventura County prepares for an approaching storm. ANTHONY PLASCENCIA/THE STAR

Gallery: Las Virgenes reservoir close to spilling

The Las Virgenes Municipal Water District reservoir in Westlake Village is near capacity as Ventura County prepares for an approaching storm. ANTHONY PLASCENCIA/THE STAR

INTENSE STORM TAKES AIM

County prepares to receive nearly inch of rain per hour

CHRISTIAN MARTINEZ
Ventura County Star 2/17/2017

As the largest storm to hit Ventura County since March 2011 made its way to the region Thursday, residents and public officials alike readied for the deluge.

County work crews fanned out to clear basins and storm drains in advance of the storm, Kevin McGowan, assistant director of the county's Office of Emergency Services, said Thursday.

The Ventura County Fire Department and Caltrans ramped up their staffing, with designated fire stations throughout Ventura County letting residents fill sandbags.

STAR FILE PHOTO

As the county faces a forecast of lots of rain, a high-surf advisory has been issued until 7 a.m. Sunday.

"We've gone into a heightened level of staffing," said Steve Swindle, a fire engineer and spokesman for the department, adding that every other fire department in the county was doing the same. The department planned to add about 70 people during the worst of the storm and open its department operations center at Station 50 in Camarillo to coordinate. The center is a smaller version of the sheriff's emergency operations center on South Victoria Avenue in Ventura that will also be open during the storm.

"It's all precautionary. We have to be ready to go," Swindle said. The storm comes as Caltrans crews are still repairing some of the damage from other storms earlier this year, including a rockslide along Decker Canyon Road, said Michael Comeaux, a spokesman for Caltrans.

"We will be fully staffed on Friday," he said.

Caltrans also plans to have road crews working into late Friday and early Saturday.

"We really hate to close roads if we don't need to," Comeaux said.

McGowan said the Office of Emergency Services issued a voluntary evacuation order for homes in Camarillo Springs. The area was hit hard by storm-driven rock and mud flows in December 2014.

The voluntary evacuation order will begin at 8 a.m. Friday and stay in place into the evening Friday, officials said. A Red Cross shelter at Leisure Village will open at 8 a.m. for residents.

Classes were canceled on Friday for the nine schools in the Ojai Unified School District and St. Bonaventure High School in Ventura.

Many school districts in the county, including the Conejo Valley Unified School District and Oxnard School District, had already planned a fourday weekend for Presidents Day. Parents should consult their child's school for any closures.

'Not a typical storm'

Kathy Hoxsie, a meteorologist with the National Weather Service in Oxnard, said it's been six years since Ventura County has seen a storm of this magnitude.

Forecasters are expecting 2 to 6 inches to fall over the coast and inland areas between late Thursday and early Sunday. The county's mountains and foothills could get 5 to 10 inches.

"This is not a typical storm," Hoxsie said. "The last time we a had a storm of this type was March 2011."

The Office of Emergency Services will be using a host of technologies during the storm to monitor for any possible flooding as well as rock and mud flows, McGowan said. They include stationary cameras as well as cameras mounted on unmanned vehicles. They also include sensors that measure rain and flooding. The weather agency also issued a high-surf advisory from 7 p.m. Thursday to 7 a.m. Sunday. Surf between 6 and 9 feet is expected Thursday and is due to increase Saturday to between 8 and 13 feet, officials said.

Due to the intense rainfall, a flash-flood watch will be in effect from Friday morning to Saturday morning. According to the weather agency, rain could fall at a rate of nearly 1 inch per hour. Of particular concern are areas burned by wildfires in the Solimar area and Camarillo Springs.

The Ventura County Fire Department advised caution during the storm, suggesting that residents prepare emergency supplies in advance, including water, first-aid kits, flashlights and food.

Fire crews will be stationed in areas where rain-related problems have occurred.

"As you know, the burn areas are of particular caution for us because there is nothing holding the soil," Swindle said.

Flood task forces of rescue teams and fourwheel- drive vehicles are being deployed.

Sandbags are available to the public at various locations across the county. Call 371-1111 to find the nearest fire station with sandbags, Swindle said.

Residents can also stay informed of emergency situations by signing up for VC Alert by calling 648-9283 or visiting www. readyventuracounty.org.

Staff writer Megan Diskin contributed to this report.

Heavy rain may have undermined spillway

Report details hillside erosion, offering first glimpse from officials on lead-up to failure at Oroville Dam.

WATER RELEASED from Lake Oroville continues to swell the Feather River on Thursday, flooding a road in Gridley, Calif. Officials believe they've drained the lake enough that coming rains won't overwhelm it again. (Marcus Yam Los Angeles Times)

By Paige St. John and Joseph Serna
LA Times 2/17/2017

OROVILLE, Calif. — Rainwater erosion alongside the Oroville Dam's main spillway appears to have contributed to the heavy damage that prompted a crisis, forcing more than 100,000 to be evacuated from their homes, a report reviewed by The Times showed.

A summary of the incident, prepared by state water officials four days after the crater in the concrete chute appeared, said water from heavy rains hit the hillsides where the massive concrete spillway runs.

Flowing water during heavy rains was "diverted ... effectively eroding and undermining the spillway, causing a section to collapse," said the incident summary.

The report offers the first indication from officials of what might have caused the catastrophic failure of the spillway. It's unclear whether the rainwater was a primary reason for the spillway damage or one of many.

The spillway follows the slope of a dirt- and tree- covered hill that helps secure the towering dam, which is America's tallest. The spillway fracture began as a 200-foot-wide hole that was 35 feet deep, but over the last week it has gotten significantly worse. Photographs of the initial damage show soil washed away beneath the sidewall of the concrete spillway and along its outer edge.

The damage to the spillway began a chain of events that led to the mass evacuations. Officials shut off releases to the spillway to investigate, and that caused water levels at Lake Oroville to rise. Then a storm dumped more rain than expected, causing the lake to exceed its limits and push water down an unpaved emergency spillway.

On Sunday, officials detected encroaching gullies that threatened that emergency spillway and, fearing that it could collapse, ordered numerous communities downstream to evacuate. Since then, officials have been using the damaged main spillway to lower the level of the reservoir, easing the crisis.

The state Department of Water Resources has provided no public statements on the cause of the collapse. Agency spokesman Chris Orrock, at the incident command post in Oroville on Thursday morning, said the cause remained under investigation.

Orrock confirmed that the incident summary refers to the initial damage and not to subsequent damage to the concrete spillway that occurred when it was put back into use.

Bill Croyle, acting director of the Department of Water Resources, said determining the cause of the spillway collapse could take months.

Officials have estimated that fixing the spillway could cost $200 million or more. Because the spillway has been used to reduce the water levels at the reservoir, officials said they still need to assess the level of damage.

Records show the same section of spillway was repaired in 2013 but do not provide details.

Large swaths of Northern California are on track to experience their wettest winter on record, with many areas having already surpassed their average precipitation for an entire year. A new series of storms is set to hit the Oroville area over the next few days. But officials are confident they've drained the reservoir enough that the rains won't overwhelm it a second time.

With the reservoir's water level down more than 30 feet since Sunday and getting lower, Croyle said at a news conference Thursday that engineers will slow releases down the Oroville Dam's damaged main spillway from 100,000 cubic feet of water per second to 80,000 cubic feet per second over a period of several hours.

The reduction will allow crews to move into the concrete channel to clear out trees, branches and other debris that has clogged the spillway and forced the downstream hydroelectric plant to go offline, Croyle said.

There was no estimate on when the power plant would be back up and running, but it will probably not be before Monday, he said.

Meanwhile, the herculean effort to reinforce the emergency spillway before more rain arrives used a caravan of helicopters and trucks to fill three deep fissures in the dirt hillside with rocks and cement.

As of Thursday, repairs on one erosion site were completed, the second was 25% filled, and the third was 69% filled, Croyle said.

As long as the lake doesn't reach capacity, Croyle said, the emergency spillway won't be used.

The incoming storm system is weaker than the one that overwhelmed the lake last week after the dam's main spillway eroded to the point of fracture, Croyle said.

St. John reported from Oroville, Serna from Los Angeles. Times staff writer Veronica Rocha contributed to this report.

BRIAN VAN DER BRUG Los Angeles Times

HELICOPTERS FERRY sand and rocks on Thursday to the Oroville Dam's emergency spillway, where crews worked to fill fissures in the dirt hillside before more rain arrives. As long as Lake Oroville doesn't reach capacity, officials said, the emergency spillway won't be used.

After risk ebbs, will there be lasting water policy changes?

OROVILLE resident Randy Boheim prepares emergency supplies in case of an evacuation order as the Feather River continued to swell Thursday. (Marcus Yam Los Angeles Times)

By Chris Megerian
LA Times 2/17/2017

SACRAMENTO — Jeffrey Mount, a leading expert on California water policy, remembers the last time a crisis at the Oroville Dam seemed likely to prompt reform. It was 1997 and the lake risked overflowing, while levees further downstream failed and several people died.

“If this doesn’t galvanize action, I don’t know what will,” Mount said he thought at the time. But spring came, the waters receded and no changes came to pass.

Now another threat looms in Oroville, where deteriorating spillways forced widespread evacuations, and more heavy rain is around the corner. State officials have remained focused on quick fixes at the dam needed to prevent catastrophic flooding, but some are already thinking about how the crisis could spur long-term shifts in policy.

It’s a conversation that’s gaining momentum in think tanks and government offices from Sacramento to Washington, and it touches on climate change, infrastructure spending and statewide water policy.

Wade Crowfoot, a former advisor to Gov. Jerry Brown who now leads the Water Foundation, a nonprofit research organization in Sacramento, compared the situation to the state’s years-long drought.

“This is a wake-up call,” he said. “The drought reminded us we need to use water more wisely. Oroville reminds us that we need to upgrade our infrastructure and our management to move water more wisely.”

In 2014, the drought prompted Brown to sign the state’s first-ever law for managing groundwater, which had been depleted as farmers tried to keep crops alive. Now there are new considerations as California strains under one of its wettest winters on record.

Crowfoot said officials should curtail Southern California’s reliance on water delivered from the northern reservoirs including Lake Oroville, reducing pressure on the state’s infrastructure by increasing water recycling or stormwater capture. Another step could be focusing on sending more water to underground aquifers, replenishing groundwater supplies.

With Oroville the subject of round-the-clock news coverage, state leaders can “treat it as an opportunity to rethink how we’re providing water and moving water,” Crowfoot said.

California has always grappled with cycles of drought and deluge — Gov. Leland Stanford used a rowboat to reach his inauguration in 1862 — but the problems are expected to be exacerbated by climate change.

Environmentalists view Oroville as a reminder of that looming threat.

“This is a dam that was designed in the ’50s and built in the ’60s,” said Adrienne Alvord, a California-based director of the Union of Concerned Scientists. “It was built for a climate we no longer have.”

Infrastructure needs to be assessed based on the increasing chance of extreme weather, she said, just like buildings near fault lines are constructed to deal with the possibility of strong earthquakes.

“We need to figure out how to design infrastructure to withstand these forces,” Alvord said. “Oroville is kind of the tip of the iceberg.”

Although President Trump has not embraced the fight against global warming, he’s talked extensively about the need to spend more money on the country’s infrastructure. White House Press Secretary Sean Spicer on Tuesday called Oroville “a textbook example” of overdue investment.

“Dams, bridges, roads and all ports around the country have fallen into disrepair,” he said. “In order to prevent the next disaster, we will pursue the president’s vision for overhaul of our nation’s crumbling infrastructure.”

Rep. John Garamendi (D-Walnut Grove), whose district includes areas that would be flooded by a failure at the Oroville Dam, echoed the call for more spending on infrastructure from the U.S. House floor on Tuesday.

“Do we want to wait until there’s a disaster to take cautionary steps or to put it back together?” he said. “Or do we want to get ahead of these potential disasters?”

Representatives from the Oroville area aren’t quite ready to start talking about next steps, especially with lives still in danger if the risk of flooding returns.

“I’m in 100% public safety mode,” said Assemblyman James Gallagher (R-Yuba City), whose district line runs across the dam itself. “We’re just trying to make sure we get through this crisis and people are kept safe through this whole thing.”

But Gallagher has talked about the need to boost the state’s investment in reservoirs, and he expects to return to the topic in the future.

“Once we get through this, I’m absolutely going to be talking about how this underscores how we need to invest in our infrastructure and ensure that all of our infrastructure is being properly maintained,” he said. “That should be a top priority in California’s budget every year.”

The current situation “puts an exclamation point on that,” Gallagher added.

Even if state and federal policymakers move forward on fixes, it’s likely they’ll run into a problem that dogs nearly all government decisions — where will the money come from?

Early estimates put a price tag of $100 million to $200 million on repairs to the Oroville Dam. The concrete spillway has a gaping hole, and the adjacent emergency spillway has suffered from erosion that threatened to topple a concrete wall along the lake’s rim, unleashing a 30-foot wall of water.

So far workers have been using boulders and concrete to patch the erosion, but more repairs will probably be needed in the future.

Questions of cost have been a factor in past conversations about reinforcing the Oroville Dam’s facilities. Mount, a senior fellow at the Public Policy Institute of California, expects it to be a hurdle again.

“What I fear will happen is what happened in 1997. When we sit down and start to look at the price tag, we’re going to run into two problems,” he said. “It’s really expensive, and no easy way to pay for it.”

BRIAN VAN DER BRUG LOS ANGELES TIMES

TONI RUGGLE, district manager for the California Water Service, surveys the Feather River at Bedrock Park, downstream from the Oroville Dam, on Thursday. Heavy rains are expected this weekend.

Oroville Dam woes raising interest in flood insurance

TYLER HERSKO
Ventura County Star 2/16/2017

Although mandatory evacuations have ceased for Butte County residents near a damaged spillway at the Oroville Dam, questions are being raised about flood insurance in preparation for a storm that could unleash a torrent on nearby communities later this week.

The problem is that for Oroville residents, it may too late to acquire flood insurance that would cover the immediate threat, said Edith Lohmann, a national flood insurance specialist with the Federal Emergency Management Agency. With few exceptions, flood insurance plans take a month to go into effect, Lohmann said.

“There is a standard 30-day waiting period before a flood insurance policy goes into effect, so we encourage people to talk to their flood insurance representative early,” Lohmann said.

The Oroville situation has caused a number of concerned residents to reach out to flood insurers throughout the state. For some, that means purchasing a flood insurance policy through the federal National Flood Insurance Program, which is managed by FEMA.

The federal system does not have specific state branches and instead has residents acquire the insurance through a list of approved companies. As of Dec. 31, FEMA was enforcing 33 flood insurance policies in Oroville. In total, the policies covered over $10 million and cost policyholders around $45,051 a year. The greater Butte County enforced 1,630 flood insurance policies that covered nearly $379 million and cost policyholders almost $1.4 million a year.

For others, private insurance providers can offer better deals. Rebecca Byrom, owner of the San Diego-based California Flood Insurance agency, said that she received 30 phone calls Tuesday morning from California homeowners scrambling to acquire flood insurance.

“I had somebody call and tell me that they had 4 feet of water in their house and they wanted to get an insurance policy,” Byrom said. “It’s like being in an automobile accident and then calling your insurance company to get insurance. It just doesn’t work like that; you have to have foresight.”

By Tuesday afternoon, the mandatory evacuation order in the Oroville area had been lifted, but emergency workers were still racing to reduce the lake's water level before storms hit the area. Some Oroville residents, such as homeowner Catherine Farnham, believed flood insurance would be important for those who live downstream from the dam.

'I live above the lake, so my only concern was for family members visiting the area,' Farnham said. 'But for those living (downstream), they should probably have flood insurance.' If the dam were to fail, the damage could be financially catastrophic,

according to data released by CoreLogic, an Irvine-based firm that tracks the housing industry. An analysis released by the firm on Wednesday noted that in the six primary counties at risk if the Oroville dam were to completely fail, about 50,000 homes would be affected and it would result in about $13.3 billion in reconstruction costs. The CoreLogic figures show more than 20,000 homes could be affected in Yuba City and more than 11,000 in Oroville. The company declined to elaborate on the data.

Some homeowners, such as those with federally backed home loans, are required to have flood insurance, according to Kelly Hudson, an external affairs officer with FEMA. Acquiring flood insurance can be particularly important for areas that are at risk of flooding, such as communities near dams, Hudson said. “In high-risk areas, there’s at least a one in four chance of flooding during a 30-year mortgage,” Hudson said.

Regardless of the kind of insurance provider used, Byrom noted that due to contractual obligations, there was little risk that a company would raise insurance rates or drop customers in response to situations such as Oroville’s flood threat. However, Byrom added that customers should be aware that insurance providers could decline to renew contracts after they have been fulfilled.

As for the Oroville situation, although a new flood insurance plan would unlikely cover any damage caused by a potential dam break this week, Lohmann encouraged residents to consider purchasing flood insurance. She noted that it could be purchased at any time and could be valuable as 2017’s rainy winter season continues.

Strained flood control system faces new tests

Oroville Dam is not the only risk, officials say

WORK CONTINUES Wednesday to shore up the emergency spillway at Oroville Dam. The state's flood control system has been strained by record precipitation. (Brian van der Brug Los Angeles Times)

By Rong-Gong Lin II, Paige St. John, Matt Stevens and Corina Knoll
LA Times 2/16/2016

OROVILLE, Calif. — The frantic effort over the last few days to lower water levels at Oroville Dam after the structure's two spillways became damaged is part of a larger drama playing out as California rapidly shifts from extreme drought to intense deluges.

Large swaths of the region are on track to experience their wettest winter on record, with many areas having already surpassed their average precipitation for an entire year.

And all that water is putting new strains on the network of dams, rivers, levees and other waterways that are essential to preventing massive flooding during wet years like this one.

The biggest danger zone lies in the Central Valley at the base of the Sierra Nevada, whose tall peaks can wring the skies of huge amounts of rain and snow. The area is essentially one giant floodplain that would be easily transformed into an inland sea without man-made flood control. At 400 miles long and 40 miles wide, it has only a tiny bottleneck from which to drain — a one-mile opening at the Carquinez Strait at San Pablo Bay — before water heads into the San Francisco Bay.

“You got this big bathtub — water doesn’t flow out of it very quickly,” said Jeffrey Mount, senior fellow at the Public Policy Institute of California and former director of the UC Davis Center for Watershed Sciences.

As the site of the nation’s tallest dam and the main storage for the State Water Project that sends water to the Southland, Lake Oroville has commanded national attention as the crippled spillways forced the evacuations of more than 100,000 downstream. But smaller water systems are also under intense pressure.

Sixteen reservoirs, ranging from small to the biggest in the state, were above 90% full as of Wednesday morning.

Among them is the Don Pedro Reservoir, the sixth-largest in California and located near Yosemite National Park. As of Wednesday afternoon, it stood at 827.4 feet, just shy of its 830-foot capacity, the Turlock Irrigation District said in a statement. The district continued to make releases to the Tuolumne River, which flows through Stanislaus County and into urban centers such as Modesto.

Forecasters predict that about 4.7 inches of precipitation could fall in the watershed over the next six days. Although the irrigation district said it does not anticipate an overflow, it advised residents of Stanislaus and Merced counties to register for emergency notifications.

In the Sacramento Valley, Shasta Dam, the spigot for California’s largest water storage lake, and Keswick Dam both released large volumes of water for multiple days into the Sacramento River.

The National Weather Service’s California Nevada River Forecast Center warns that the San Joaquin River at Vernalis in San Joaquin County will surge into the “danger stage” this weekend, the first time this winter that the center has made such a warning. That could put the town of Lathrop, south of Stockton, at risk.

Earlier this week, evacuation orders were issued for Tyler Island, a small farming tract in the Sacramento Delta, after a compromised levee posed a risk of flooding.

To water experts, it’s a pattern that plays out in years of heavy rains. Lakes pushed to capacity have placed tremendous strain on levees, some of which were built long ago and were weakly constructed. Perceived as fail-safes, levees were meant to reduce the frequency of floods, not stop them altogether, experts say.

“They’re really the No. 1 defense against floods, and they’re not very good at it,” Mount said. “Levees are kind of unreliable partners in flood management.”

Hoping to avoid the situation faced at Lake Oroville, officials are planning large releases of water from reservoirs. But that could further strain the hundreds of miles of levees that line the Central Valley’s vast river networks, built to protect homes, businesses and farms from floods. The series of storms that slammed the area in December 1996 and lasted for a week caused numerous levees to collapse. Widespread flooding that

inundated 300 square miles led to extensive damage and evacuations of 120,000 people, as well as nine deaths.

While the state's reservoirs are built to release water slowly, officials are forced to quicken the pace of releases when they are at capacity. Water from brimming reservoirs is guided into nearby rivers. If those rivers are full, water can seep over and under levees, or through hidden cracks, leading to erosion.

The expectation of more storms this season and a massive snowpack likely to run off into the summer has officials grappling with their options.

"After several years of drought, now we've got too much all at once," said Jeremy Hill, a civil engineer who is part of the Department of Water Resources' flood operations team.

Hill said the threat of floods would be a lasting concern until the end of spring.

Levees were not designed to be stressed for extended periods of time and they require constant supervision, said Joseph Countryman, a member of the Central Valley Flood Protection Board. Even without major rainstorms, the magnitude of the volume of water flowing through the system will still create "tremendous seepage" in the levees, potentially weakening them. And significant flows are to be expected through June, he said.

"The longer the water is on levees, the more potential they have to become saturated and develop problems they have never before exhibited," he said.

State water officials said that despite the record rainfall, they remain confident the flood control systems will hold up.

"There's a lot of water moving around, and everything's full and everybody's going to have plenty of water," said Bill Croyle, the acting director of the Department of Water Resources who was at incident command headquarters for the Oroville Dam. "I don't think it's testing the system."

Even as rain began to fall Wednesday, Croyle said the storms forecast over the next few days will not be enough to test the integrity of Oroville Dam or its two damaged spillways. He said the public "won't see a blip in the reservoir" levels, now dropping about 8 inches an hour.

Officials at the dam said their biggest worry wasn't the weather but the damage done to the dam's already compromised main spillway during days of sustained pounding from heavy releases of water. When the emergency spillway began to fail Sunday, officials began sending massive amounts of water down the main spillway — despite the damage — in a desperate effort to reduce the water level.

"It's holding up really well," Croyle said of the main spillway. But he added continued mass water releases could be causing hidden damage to the rocky subsurface adjacent to the concrete chute.

St. John reported from Oroville, Lin from San Francisco, and Knoll and Stevens from Los Angeles. Times staff writers Veronica Rocha and Joseph Serna contributed to this report.

BRIAN VAN DER BRUG Los Angeles Times

WATER OFFICIALS said their biggest worry at Oroville Dam is not the weather but the damage already done to the dam's main spillway.

Oroville's dangers are far from unique

By Jacques Leslie
LA Times 2/16/2017

What is most sur- prising about the near-collapse of a spillway at Oroville Dam is that events like that have not happened more often.

Located 75 miles north of Sacramento, Oroville is the nation's tallest dam and holds back the state's second-largest reservoir. Both its main spillway and an auxiliary one have experienced major erosion because of massive emergency releases of reservoir water during this winter's heavy storms. On Sunday, engineers worried that the top 20 or 30 feet of the emergency spillway could give way, causing devastating flooding on the Feather River. State officials ordered the evacuation of nearly 200,000 people living downstream from the dam.

This drama and danger could have been averted. Three environmental groups — Friends of the River, the Sierra Club and the South Yuba Citizens League — anticipated precisely the crisis that has unfolded this week. In response to the dam's relicensing application in 2005, they filed a motion with federal officials to require that the earthen hillside that comprises the auxiliary spillway be covered with concrete to prevent erosion.

But according to the San Jose Mercury News, federal officials dismissed the request on the grounds that even if the emergency spillway suffered "significant damage," it would not threaten control of reservoir water or endanger the dam itself. Instead, the officials sided with the California Department of Water Resources and the state water districts that probably would have had to pay for the new construction.

Ron Stork, policy director of Friends of the River, said state water officials told him privately at the time that the Metropolitan Water District of Southern California and other water contractors that buy Oroville's water did not want to pay the additional costs. "I felt a little disrespected and damn disappointed that they didn't listen to me, particularly in the last week," Stork told me Monday.

Metropolitan general manager Jeffrey Kightlinger, in the Los Angeles Times, claimed his agency "did not say it was a cost issue." The water district deferred to state and federal officials, he said, who determined the emergency spillway met guidelines that "talk about how you don't put a lot of funding and concrete, etc. into emergency spillways because presumably they will rarely if ever be used."

The south-versus-north dynamic is an old one in the state's water politics. In general, Southern California water users not only consume Northern California water but

significantly underpay for it. Now, the people who live downstream from the Oroville Dam, who must continue to be prepared for evacuations “at a moment’s notice,” are paying dearly for what should have been covered by Southern California rate-payers a decade ago. On top of this, even if the dam’s spillways suffer no further damage, the cost of repairing the spillways will no doubt far exceed the expense of the preventive measure proposed in 2005.

Even more disturbing, Oroville is far from unique among the nation’s nearly 100,000 dams in needing repair. Dams usually require significant maintenance between their 25th and 50th birthdays, and virtually all U.S. dams are at least 40 years old; some were built more than a century ago. (Oroville will be 50 years old next year.)

Yet few dams are getting the repairs they need. The last time the American Society of Civil Engineers issued its Infrastructure Report Card was in 2013, when it gave U.S. dams a “D” grade and reported that more than 4,000 are deficient. The group will publish a new report card next month; while its contents haven’t been released, a spokesperson told me the conclusions of the 2013 report card are “still fairly accurate.” A 2016 survey by the Association of State Dam Safety Officials estimated the cost of repairing deficient dams that currently place downstream residents at risk at $22.91 billion. Carrying out that task would take many decades.

Rather than fund that work, politicians prefer to be seen cutting ribbons while standing in front of new dams. Even now, California officials are considering construction of more dams while much of the existing stock needs repair. From time to time, legislation is introduced in Congress to begin dam repair, but it inevitably dies. Meanwhile, President Trump has spoken of launching a massive plan to revitalize American infrastructure, but he has not issued a detailed proposal, and in any case, he seems to favor financing new construction with public-private partnerships that would work for, say, toll roads, but not dams.

Without a major repair program, the passage of time will further compromise dam safety. As the human population grows, more people are living downstream from vulnerable dams, usually without any idea of the risk they are taking. Climate change is intensifying that risk by inducing intense precipitation events and runoff that dams were not designed to handle. Indeed, climate change probably caused or at least deepened the five-year drought that preceded this winter’s heavy rain in Northern California. The drought almost certainly lowered the capacity of soil in the Oroville watershed to absorb water and increased storm runoff into the reservoir.

In 2005, I wrote that large dams “are loaded weapons aimed down rivers, pointed at ourselves; they’re proof of the gambling nature of the societies that build them.” A

decade later, we have taken no significant steps toward disarming dams. Instead, our gamble has intensified.

Jacques Leslie is a contributing writer to Opinion and the author of “Deep Water: The Epic Struggle Over Dams, Displaced People, and the Environment.”

CAPITOL JOURNAL

Lessons from Oroville crisis

The near-catastrophic dam spillway breakdowns could have been avoided. And now we must pay the price.

WATER SURGES from the main spillway at Oroville Dam on Wednesday. Repairing that spillway's huge crater and shoring up the dam's unlined emergency spillway could cost $200 million or more. (Marcus Yam Los Angeles Times)

GEORGE SKELTON in Sacramento
LA Times 2/16/2017

Climate change did not produce California's winter flooding that abruptly ended a devastating drought. That weather swing is just how California works.

California has endured rotating cycles of wet and dry periods throughout its history. If there are weeks of deluge, a severe drought is on the way. It happens every decade or so.

But climate change will bring more frequent and robust cycles of extreme weather. Bet on it.

"All of our climate change calculations suggest wetter wets and drier dries," says Jeffrey Mount, a water expert at the Public Policy Institute of California. He's also founding director of the Center for Watershed Sciences at UC Davis.

The amount of precipitation will stay basically the same, Mount says. But there'll be less snow and more warm rain, and thus more rapid runoff into swollen rivers.

The recent soaking, he continues, "is a window into the future. We're going to have wild swings in weather."

Former state water director Lester Snow agrees.

"We'll move very dramatically from historic drought to historic precipitation — a protracted dry period followed by a record storm," Snow says. "This will increase the need for off-stream and underground water storage."

"We need to take a comprehensive look into how we operate our dams," Mount says.

That's an understatement after the near-catastrophe last weekend at Oroville Dam, the tallest dam in the nation and keystone of the State Water Project. It forms California's second largest reservoir.

With the lake level rising rapidly and water being released into the Feather River as quickly as possible, a giant crater was carved by erosion in the main spillway. Then water began eroding a nearby emergency spillway that was unlined and had never previously been used.

Officials feared a 30-foot wall of water could burst out of the reservoir. So they ordered more than 100,000 people living downriver to flee their homes. Fortunately, no deaths were reported. And two days later the evacuees were allowed back.

Turns out, environmentalists had warned dam officials more than a decade ago that the emergency spillway was vulnerable and should be lined with concrete. It wasn't. Government officials went into denial mode. Pouring concrete would cost lots of money. No one leaped forward with their checkbooks.

Last weekend, what environmentalists feared could happen did. And it was compounded by the main spillway starting to break apart.

"We need some forensic engineering to find out what happened" on the main spillway, Snow says. "Was something wrong with the concrete? Did something happen underneath? People speculate it might have dried out underneath because of the drought.

"If we can't rely on the main spillway, we can't ever fill Oroville again."

Mount's take: "It's an emergency, so it's finger-pointing time. Someone has to hang for all this. They're out trying to find someone to hang. They might want to dig up the engineers who designed it and hang them, but they're dead already.

“Was it bad design or bad maintenance? We don’t know. The evidence has been washed away. The crime scene has been wiped clean.”

Repairs to both spillways could cost $200 million or more.

“Spend whatever money it takes — whether it’s $150 million or $500 million,” Snow says. “Water districts have to pay. That’s my take. It’s the water users’ obligation.”

That means primarily the Metropolitan Water District of Southern California.

There’s bound to be squabbling about whether the repairs are mostly for storing and transferring water or controlling floods. The answer will largely determine whether it’s the water users who pay — such as farmers in the San Joaquin Valley and urbanites in Southern California — or everyone in the state.

I’m with Snow. Charge the water users. A spillway wouldn’t be needed at all without a dam to store water for farms, industry and homes.

But politicians and government would much rather build something new than fix what already exists. Like automobiles, dams need to be periodically serviced to stay operational. But unlike autos, you can’t just trade in a dam on a new one.

There’s another problem with California’s waterworks. They were built for a much smaller population. When Oroville Dam was approved by voters in 1960, fewer than 16 million people lived in California. Now the population is approaching 40 million.

There’s increasing demand for water — not only by people, but corporate growers who keep planting more nut orchards in the parched southern San Joaquin Valley, even during a drought.

Meanwhile, California’s salmon fishery has suffered as the Sacramento-San Joaquin River Delta is used as an unnatural holding pond for water pumped south, confusing and chomping up young fish trying to reach the ocean.

Agriculture gulps 80% of California’s developed water. At some point — and we’re long past it — California should start zoning for types of crops in the driest parts of the state. We zone for shopping malls, waste dumps and residential neighborhoods. Why not crop types?

There was one ray of sunshine from the Trump administration Tuesday.

White House spokesman Sean Spicer said the Oroville Dam breakdown “is a textbook example of why we need to pursue a major infrastructure package in Congress.”

Gov. Jerry Brown asked President Trump to pitch in with federal aid to deal with the Oroville emergency and flooding throughout California. The governor quickly got a positive reply. No tacky political games.

Now if Trump could just join Brown in fighting climate change.

Dam evacuation order lifted

Lake drained enough to reduce collapse risk

JONATHAN J. COOPER AND DON THOMPSON ASSOCIATED PRESS
Ventura County Star 2/15/2017

OROVILLE - Nearly 200,000 Northern Californians who live downstream of the country's tallest dam were allowed to return home Tuesday after two nights of uncertainty. But they were warned they may have to again flee to higher ground on a moment's notice if hastily made repairs to the battered structure don't hold.

The fixes could be put to their first test later this week with the first of a series of small storms forecast for the region. But the real test is still to come in the weeks ahead when a record amount of snowfall melts in nearby mountains.

'There is the prospect that we could issue another evacuation order if the situation changes and the risk increases,' Butte County Sheriff Kory Honea said.

The Feather River flows through Oroville downstream from a damaged dam Tuesday. Workers are rushing to repair two eroded spillways at the nation’s tallest dam, but officials canceled an evacuation order.

MARCIO JOSE SANCHEZ/AP

Residents below the Oroville Dam were suddenly ordered to evacuate Sunday after authorities had assured them for nearly a week that the dam was sound despite a growing hole found in the structure's main spillway. Over the weekend, the swollen lake spilled down the unpaved emergency spillway for nearly 4 0 hours, eroding it badly.

State officials said they have drained enough of the lake behind Oroville Dam that the emergency spillway will not be needed to handle runoff from an approaching storm.

Trucks have dumped 30 tons of bags loaded with sand, concrete blocks and boulders every hour into the damaged areas, while helicopters have dropped bags of rocks and concrete blocks onto the problem sites.

Gov. Jerry Brown said late Tuesday that the Federal Emergency Management Agency approved his request for federal assistance with the Oroville Dam situation. Meanwhile, federal regulators have told managers at the state Water Resources Department that they must enlist a group of 'independent consultants' both to assess what went wrong and how to make long-term spillway repairs.

Oroville is a reminder of St. Francis tragedy

AMANDA COVARRUBIAS
Ventura County Star 2/15/2017

It was just before midnight March 12, 1928, when the St. Francis Dam north of Santa Clarita collapsed, sending 12 billion gallons of water gushing to the Pacific Ocean and killing at least 530 people.

The torrent raced 54 miles down the Santa Clara River Valley, a 180-foot wall of water sweeping away homes, livestock, vegetation and people. It was California's second- worst disaster at the time after the San Francisco earthquake and fire.

The tragedy is considered one of the worst American civil engineering failures of the 20th century and ended the career of William Mulholland, the legendary selftaught engineer who built the Owens River Aqueduct and made it possible for modern Los Angeles to flourish.

Lessons learned from the St. Francis Dam tragedy may have helped spare the lives of those who were evacuated in the Oroville Dam spillway emergency in Northern California, experts said.

"In Oroville, the emergency spillway may have failed, but the dam itself is still standing," said Alan Pollack, president of the Santa Clarita Valley Historical Society. "While we don't know the technical details of why it's still standing, there were over 400 people who gave their lives in the St. Francis Dam disaster that contributed to the massive saving of lives up in Oroville." New safety regulations were established in the aftermath of the St. Francis Dam collapse, including government oversight of dam construction, he said. "No longer would we rely on just one person to build a dam without any oversight," Pollack said, referring to Mulholland. "Had the Oroville Dam been built with the defects of the St. Francis Dam, it's entirely conceivable that instead of the spillway failing, it would have been the Oroville Dam failing." The St. Francis Dam collapsed because the location was unsuitable, said Jon Wilkman, author of the book "Floodpath: The Deadliest Man Made Disaster of the 20th Century America and the Making of Modern Los Angeles." "What the Oroville situation and the St. Francis Dam collapse showed us was the enormous and destructive power of water," Wilkman said. "We often take that for granted. "In the case of the St. Francis Dam, it was a total and catastrophic failure," he continued. "It collapsed because it was placed in a poor geographic location that was not adequate for a large, concrete dam." Although construction, regulation and technology have vastly improved since the St. Francis collapse, there are other problems with dams today. The Oroville Dam was dedicated in 1968.

"Oroville Dam is very well built and there's no design flaws,' he said, 'but a lot of those big dams are not always maintained."

Pollack, who is leading an effort to have Congress establish a national memorial honoring the St. Francis Dam victims, said that when he heard about Oroville over the weekend, he immediately thought of the 1928 tragedy.

“There’s many who say the St. Francis Dam disaster occurred more than 90 years ago, and why do we care about something from so long ago?” he said. “But this is not ancient history. To this day, it’s relevant. Those who don’t learn from history are doomed to repeat it.”

This aerial view shows the broken water barrier of San Francisquito Canyon after the St. Francis Dam burst in 1928. PICASA, AP

Jon Wilkman

An ‘aggressive, proactive attack’ at Oroville Dam

Crews work to repair spillways as another storm looms

EVACUEE Sharon Dalton, right, hugs Raiden Ellis, 10 months, and Chris Ellis at the Bangor Community Hall in Bangor, Calif. Evacuees found shelter in a variety of places, including Sikh temples. CALIFORNIA, B1 (Brian van der Brug Los Angeles Times)

By Paige St. John, Laura J. Nelson, Rong-Gong Lin II and Veronica Rocha
LA Times 2/15/2017

OROVILLE, Calif. — With both spillways badly damaged and a new storm approaching, America’s tallest dam on Tuesday became the site of a desperate operation to fortify the massive structures before they face another major test.

A swarm of trucks and helicopters dumped 1,200 tons of material per hour onto the eroded hillside that formed the dam’s emergency spillway. One quarry worked around the clock to mine boulders as heavy as 6 tons. An army of workers mixed concrete slurry to help seal the rocks in place.

“This is an aggressive, proactive attack to address the erosion,” said Bill Croyle, acting director of the state Department of Water Resources. “There’s a lot of people, a lot of equipment, a lot of materials moving around, from the ground and from the air.”

At the main spillway, a different and riskier operation was underway: Despite a large hole in the concrete chute, officials have been sending a massive amount of the swollen

reservoir's water down the chute to the Feather River in a desperate attempt to reduce the lake's level.

The structure continued to hold Tuesday without sustaining more significant damage, officials said.

The idea is to get the reservoir's water level low enough that it can take in rain from an upcoming series of storms without reaching capacity. If the reservoir filled up again, water would automatically flow down the emergency spillway, which on Sunday appeared to be nearing collapse, forcing the evacuation of more than 100,000 people downstream.

Crews releasing 100,000 cubic feet of water per second through the main spillway lowered the lake's level by about one foot per hour without causing more damage to the main spillway, engineers said. Meanwhile, hundreds of construction workers used thousands of tons of concrete and rock to shore up the erosion that had carved fissures into the unpaved slope next to the dam.

The reservoir's water line is expected to fall 50 feet by late Saturday or early Sunday, providing a buffer capacity of half a million acre-feet, officials said. That would avert the risk of using the eroded hillside as an emergency spillway again, officials believe.

In a sign of the progress made Tuesday, officials downgraded the evacuation order to a warning, allowing all evacuated residents to return home.

"They have to be vigilant," Butte County Sheriff Kory L. Honea said at a news conference. "They have to pay attention to what's going on. There's the prospect that we can issue another evacuation order if circumstances change."

Workers concentrated their efforts on shoring up the hillside just below the emergency spillway's weir, a low concrete wall that is designed to be the last defense for Lake Oroville.

The weir is designed to hold the reservoir to its maximum height. If the reservoir overflows again after days of rain this week, and water pours down the hillside, the earth beneath the weir could be chewed away. That could send a 30-foot wall of water down the Feather River and into neighboring towns.

With airlifted bags of boulders and layers of concrete, crews have been filling fissures that eroded during emergency efforts to release water from behind the dam.

"The large rocks will break up the flow of water a bit so it won't have so much energy," said John France, an engineering consultant at Aecom who has worked on dams for more than three decades. "If the water has less energy, the underlying structure won't erode as quickly."

It's a repetitive but essential process.

“You’re putting rocks in a hole. Then you’re putting slurry in to solidify it,” said Water Resources spokesman Chris Orrock. “When water comes down, it will hit that patch and roll off.”

Meanwhile, state engineers are watching the damage to the main concrete spillway using cameras and overhead flights. The current release of water creates a curtain that obscures most of the gaping hole discovered last week, but what is visible from the side suggests the damaged area has not grown, Croyle said.

“It’s performing very well,” he said, adding that the amount of water released from the dam during the crisis is a state record. Archived data from the state agency shows water releases exceeding 150,000 cubic feet per second in 1997, leading to the failure of a levee on the Feather River downstream and evacuation of communities for 22 days.

The soccer fields and picnic grounds at Marysville’s riverfront park were submerged long ago. At the town’s cemetery, 26 miles south of the dam, family plots were almost completely submerged, with the tips of tombstones poking through the still water.

Spring flooding is common in the low-lying basin, Sutter County spokesman Chuck Smith said. The Feather River can handle up to 280,000 cubic feet per second of water flow, he said, but that would bring the water level to the top of the river’s steep banks.

“At 200,000 [cubic] feet [per second] is where we would start to panic,” Smith said. Water Resources is currently releasing half that volume from the dam.

Sutter County’s emergency planning scenarios include a collapse of the Oroville Dam. Those documents estimate it would take a little more than eight hours for the first wave of high water to reach Marysville, leaving county officials a two-hour window to order evacuations.

But other communities, notably Oroville, are much closer to the dam and would be hit much more quickly.

During the mandatory evacuation period in Sutter and adjacent Yuba counties, residents who had defied the order could be seen in Marysville and Yuba City.

Kathy Sedlar, 60, said she and her husband were unaware of Sunday’s order to leave until the highway out of town was already frozen in gridlock.

She feared becoming trapped in the traffic if the dam spillway did fail, “So I guess I’ll stay,” she said. But she did not sleep. She and her husband spent the night monitoring live broadcasts from the drama in Oroville.

Honea, the Butte County sheriff, said he would leave it to residents to decide whether to leave if rising water levels again force use of the emergency spillway. He said he would order another evacuation only if something were to suggest the repaired slope was again deteriorating.

The new storm system is expected to arrive late Wednesday or early Thursday morning and could bring two to four inches of rainfall to Lake Oroville.

Falling temperatures are expected to help officials by lowering the elevation at which some precipitation falls as snow. But Croyle said that merely delays when the dam will be required to handle the melt from what has been a spectacular snow year.

Federal emergency officials and the Trump administration approved Gov. Jerry Brown's requests for presidential disaster declarations for both the Oroville Dam and the response to major winter storms in January, including mudslides and power outages.

"I want to thank FEMA for moving quickly to approve our requests," Brown said in a statement from his office.

At a news briefing Tuesday, White House Press Secretary Sean Spicer said President Trump has been "keeping a close eye" on the situation in Oroville.

"The situation is a textbook example of why we need to pursue a major infrastructure package in Congress," Spicer said. "Dams, bridges, roads and all ports around the country have fallen into disrepair."

St. John reported from Oroville, Nelson and Rocha from Los Angeles and Lin from San Francisco. Times staff writers Joseph Serna in Los Angeles and Peter H. King and Chris Megerian in Oroville contributed to this report.

Sources: DWR, Google Earth, detail image courtesy of AFP Getty. Graphics reporting by Rong-Gong Lin II, Chris Megerian, Brian van der Brug and Paige St. John.

Los Angeles Times

Eroding California

Oroville Dam is almost too good a metaphor for the condition of the state.

OFFICIALS have sent water surging down the concrete main spillway at Lake Oroville. (Josh Edelson AFP/Getty Images)

By Victor Davis Hanson
LA Times 2/15/2017

A year ago, politicians and experts were confidently predicting a near-permanent statewide drought, a “new normal” desert climate. The most vivid example of how wrong they were is that California’s majestic Oroville Dam is currently in danger of spillway failure in a season of record snow and rainfall. That could spell catastrophe for thousands who live below it and for the state of California at large that depends on its stored water.

The poor condition of the dam is almost too good a metaphor for the condition of the state as a whole; its possible failure is a reflection of California’s civic decline.

Oroville Dam, along with Shasta Dam, is the crown jewel of California’s state and federal system of water transfers. Finished nearly 50 years ago, the earthen Oroville Dam is the tallest dam in the United States. The resulting Lake Oroville stores 3.5

million acre feet of snow and rain runoff, and is central to transferring water, eventually via the California Aqueduct, from the wet north to the dry southern half of the state.

The dam was part of the larger work of a brilliant earlier generation of California planners and lawmakers. Given that two-thirds of the state wished to live where one third of the rain and snow fell, they foresaw a vast system of water storage and transference that would remake the face of a growing California by putting people, industry and farms where water was not.

The 19th and 20th century dams have saved thousands of lives and billions of dollars of property from perennial spring flooding. The dam at Oroville helps to control the flows of the Feather, Yuba and, ultimately, the Sacramento rivers, allowing millions of Californians in these former flood basins to live without fear of deluges. Many Californians have come of age taking dams like Oroville for granted, assuming that flooding was something of ancient family lore — and that the man-made storage reservoirs surrounding their growing cities were “natural” lakes.

The water projects created cheap and clean hydroelectric power. (At one point, California enjoyed one of the least expensive electric delivery systems in the United States.)

In addition, dams like Oroville ensured that empty desert acreage on California’s dry west side of the Central Valley could be irrigated. The result was the rise of the richest farming belt in the world. Complex transfers of water also helped fuel spectacular growth in the San Francisco Bay Area and Los Angeles Basin. Their present populations often do not fully appreciate that their dry hillsides and Mediterranean climates could never have supported such urban growth without the can-do vision of a prior generation of hydrological engineers.

Finally, besides flood control, hydroelectric power and irrigation, California dams created more than 1,300 reservoirs that presently provide the state with unmatched mountain recreational and sporting opportunities — often for the poor and middle classes who cannot afford to visit expensive coastal tourist retreats.

Yet the California Water Project and federal Central Valley Project have been comatose for a half-century — despite the drought. Environmental lawsuits and redirection of critical state funding stalled final-phase construction, scheduled expansion and maintenance. Necessary improvements to Oroville Dam, like reinforced concrete spillways, were never finished. Nor were planned auxiliary dams on nearby rivers built to relieve the pressure on Oroville.

A new generation of Californians — without much memory of floods or what unirrigated California was like before its aqueducts — had the luxury to envision the state’s existing

water projects in a radically new light: as environmental errors. To partially correct these mistakes, some proposed diverting storage water for fish restoration and re-creating wild rivers to flow uninterrupted into San Francisco Bay.

Indeed, pressures mounted to tear down rather than build dams. The state — whose basket of income, sales and gas taxes is among the highest in the country — gradually shifted its priorities from the building and expansion of dams, reservoirs, aqueducts, bridges and highways to redistributionist social welfare programs, state employee pensions and an enormous penal archipelago.

California currently hosts a third of the nation's welfare recipients. Over 1 in 5 Californians lives below the poverty line. One in 4 Californians was not born in the United States. These social transformations pose enormous political challenges and demand that infrastructure and schools grow commensurately to meet soaring populations.

Instead, California is eating its seed corn.

State lawmakers spend their time obsessing over minutia: a prohibition against free grocery bags and rules against disturbing bobcats. When they do turn their attention to development, they tend to pick projects that serve urban rather than rural populations — for example, that boondoggle of a bullet train whose costs keep climbing even as the project falls years behind schedule.

The crisis at Oroville is a third act in the state's history: One majestic generation built great dams, a second enjoyed them while they aged, and a third fiddles as they now erode.

Victor Davis Hanson is a fifth-generation rural Californian and a senior fellow at the Hoover Institution at Stanford University.

Relief may be short-lived

Evacuees return, but peril remains as new storms near

OROVILLE RESIDENT David McGlamery carries belongings back into his home along the Feather River, downstream from the imperiled reservoir. Authorities warned people living in the area to “remain vigilant and prepared as conditions can rapidly change.” (Marcus Yam Los Angeles Times)

By Hailey Branson-Potts
LA Times 2/15/2017

Authorities lifted mandatory evacuation orders Tuesday for communities downstream of the imperiled Oroville reservoir amid a lessened flood risk, but they stressed that an incoming storm system means the danger is not over and that many residents might have to flee again.

Although the storms are expected to be far weaker than the ones that inundated Northern California last week, any additional rainfall could exacerbate the problems in the region, where more than 100,000 people were evacuated Sunday because of concerns that a damaged spillway at Oroville Dam could fail.

Officials have been lowering the level of Lake Oroville for several days, preparing for the storm. Both the main and emergency spillways are damaged, but officials are hoping to continue using the main spillway throughout the storm to keep the lake below maximum capacity. By doing that, they hope to avoid more water flowing down the emergency

spillway, which was so damaged Sunday that officials feared it could collapse and cause major flooding downstream.

“All residents are advised to remain vigilant and prepared as conditions can rapidly change,” the Butte County Sheriff’s Office said in a statement. Residents, authorities said, should be prepared to evacuate again at a moment’s notice should new problems arise.

The storm system is expected to arrive late Wednesday or early Thursday morning and could bring 2 to 4 inches of rainfall over Lake Oroville, said Tom Dang, a meteorologist with the National Weather Service in Sacramento. Another storm Friday could drop an additional 1 to 3 inches on the region and is expected to have a much greater impact on Southern California.

“There’s no real sign at this stage of any let-up in the precipitation,” Dang said.

The Northern California rain is also expected to be much cooler than last week’s. That’s good news when it comes to flood concerns. Warmer storms cause mountain snowpack to melt more quickly, sending runoff coursing into rivers, canals and reservoirs.

Last week’s storm was “very warm,” with snow levels as high as 8,000 feet and higher, Dang said. This week, snow levels are forecast at 5,000 to 6,000 feet, which is much more typical for a storm this time of year, he said.

In the five days last week from Monday to Friday, Oroville received more than 6 inches of rain, according to the National Weather Service. The surrounding mountains and foothills received up to 24 inches of rain and snow in the same period.

The storm’s runoff sent water into the Oroville reservoir at an average rate of 115,260 cubic feet per second. The lake’s water level climbed 50 feet in five days.

In addition to the crisis at Oroville Dam, several levees throughout the region have seen structural damage, adding to the flood threat, Dang said. Many reservoirs in Northern California are having to release large amounts of water, causing rivers to rise.

Portions of the Sacramento and San Joaquin rivers are at or near flood stage, he said. The Feather River, downstream from Lake Oroville, has seen flooding for several days.

Although this week’s storms are expected to be smaller, they’re “certainly impactful,” Dang said.

“The storms last week have really left Northern California in a vulnerable state right now, and any amount of rainfall isn’t helpful at this stage.”

Forecasters say there is a potential for another series of strong storms in Northern California early next week that could bring additional flooding, though they are less confident about the specifics because it is still early, Dang said.

Christina Widener, 51, evacuated with her husband and her 94-year-old grandmother, who suffers from dementia. They drove to Red Bluff, about 60 miles away, before finding a motel room.

“I think it made sense at the time,” she said of the hasty evacuation order Sunday evening. “But I wish she hadn’t left.”

The mother of four has lived in her bungalow near the river’s edge for 32 years, and in 1997 defied an evacuation order despite the threat of arrest. “We didn’t leave then and nothing happened,” she said, grabbing boots and a kitty container out of her Ford SUV.

Widener had nothing but praise for the hospitality of Red Bluff — waitresses offered to pay for their meals, strangers invited them to stay in their homes. Someone even offered to do their laundry.

“They were awesome,” she said.

Although some evacuees drove far from Oroville, others made arrangements to stay with family or friends who reside in the foothills behind the lake — safe ground should the dam fail.

“As long as you are up above, you should be good, right?” said Jerry Smith, a 26-year-old solar installer. He finished loading frozen pizzas and bottled water at a newly reopened grocery store, and was eager to move on with his wife.

“I’m sorry, but we’ve got to go. We haven’t been home yet.”

Was he anxious?

“No, we should be OK.”

In Southern California, meanwhile, the storm system expected to arrive Friday could provide a walloping, with possible flash flooding, mudslides and rock slides.

“The Friday storm in particular could in fact become the strongest of the season in the Los Angeles region,” said UCLA climate scientist Daniel Swain.

A slow-moving storm is expected to debut into the Southland with some light rain Thursday night or Friday morning, but is expected to dump large amounts of rain in a short time frame during its peak Friday afternoon and evening, said Ryan Kittell, a forecaster with the National Weather Service in Oxnard.

Rainfall totals for the Los Angeles metropolitan area are predicted to be 2 to 4 inches, with 6 to 8 inches expected in the mountains and foothills, he said.

“The raw numbers don’t look that scary, but if we get the bulk of that coming over a small period, that will cause a lot of issues,” Kittell said. Much of that rain could fall within a 12-hour period Friday, and it could fall at a rate of more than an inch per hour, he said.

There is a high likelihood, Kittell said, for a “lot of roadway flooding,” as well as falling trees because the storm also is expected to usher in powerful winds.

OROVILLE DAM 188,000 evacuated after dam's spillway starts crumbling

RACE TO AVOID DISASTER

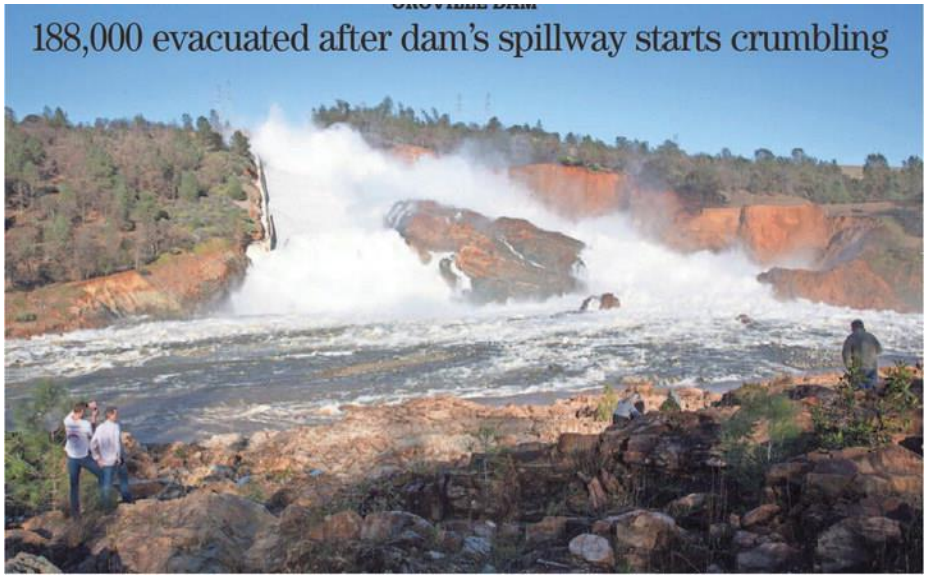
REDDING (CALIF.) RECORD SEARCHLIGHT
Ventura County Star 2/14/2017

CHICO, Calif. - Though the level of California's secondlargest reservoir dropped about 3.5 feet overnight, communities downstream still face the threat of extreme flooding, officials said Monday.

A pair of storms are expected to hit the state this week, and forecasters say they will be strong enough to bring 2 to 6 inches of rain to Oroville, where the concrete spillway at Oroville Dam has been crumbling since Tuesday, and an emergency earthen spillway with a concrete lip was eroding so severely Sunday that officials warned a 30foot wall of water could be unleashed on Oroville and other towns along the Feather River.

At least 188,000 residents were ordered to evacuate the area, about 150 miles northeast of San Francisco, late Sunday.

Forecasters anticipate a moderate storm Wednesday with a "really big and strong" storm Friday, said Brandt Maxwell, a National Weather Service meteorologist. An additional 8 inches of rain could fall in the mountains before draining into Lake Oroville, and that would increase the flow of water at the dam, where severe erosion could drop the top of the spillway enough for water to pour out uncontrolled.



Water cascades into the Feather River from the damaged Oroville Dam spillway Saturday in Butte County, Calif.

DALE KOLKE/CALIFORNIA DEPARTMENT OF WATER RESOURCES VIA EPA

Evacuee Miguel Figueroa Jr. of Gridley, Calif., catches up on some reading Monday in Chico, Calif.

PETER DASILVA/EPA “If they haven’t found something really good to do by Friday, things are going to go downhill further.”

BRANDT MAXWELL

NATIONAL WEATHER SERVICE METEOROLOGIST

“If they haven’t found something really good to do by Friday, things are going to go downhill further,” Maxwell said. “That could be a really strong storm — not just lots of rain but lots of wind, too.”

State water officials are trying to reduce the lake’s water level by 50 feet in anticipation of the storms. The storms, particularly the one Friday, have been on forecasters’ radar for several days and could be large enough to cause flash flooding anywhere in the Golden State. The storms will hit Northern California before making their way south, Maxwell said. On Sunday, the mandatory evacuation order below Oroville Dam triggered a chaotic exodus, filling highways as evacuees headed north and west for higher ground. An emergency shelter at the Silver Dollar Fairgrounds here, 24 miles north, filled within hours. Several other shelters were established.

The emergency spillway had never been activated since the dam was completed in October 1967, but it was pressed into service because Oroville Dam’s main concrete spillway developed a 200foot-long, 30-foot-deep hole Tuesday that continues to erode. Both spillways sit off to the side of the dam. Officials said the main structure remains sound.

In an effort to preserve the concrete lip of the emergency spillway, operators with the California Department of Water Resources doubled flows Sunday into the main spillway despite its bottom being largely washed out.

With 100,000 cubic feet of water leaving Lake Oroville each second, the lake level dropped quickly. That relieved some pressure on the emergency chute, but it also chewed more concrete from the bed of the main spillway.

The most recent inspection of the Oroville Dam’s main spillway didn’t include a close examination of the structure, according to a California safety report released in July.

Officials were hopeful that increased use of the main spillway would save the emergency backup chute and that efforts to backfill the main spillway’s holes with

bags of rocks could shore it up Monday. California's National Guard said it would provide eight helicopters to assist with reconstruction efforts.

It remained unclear when residents might be allowed to return home.

Contributing: Colin Atagi, The (Palm Springs, Calif.) Desert Sun

PETER DASILVA/EPA

A team from the California Department of Water Resources monitors the section of damaged spillway Monday at Oroville Dam in Oroville, Calif.

PETER DASILVA/EPA

3 groups raised concerns over spillway in 2005

IAN JAMES THE DESERT SUN
Ventura County Star 2/14/2017

In 2005, three environmental groups raised concerns that the emergency spillway at California's Oroville Dam wasn't properly built and posed serious risks.

The groups – Friends of the River, Sierra Club and the South Yuba River Citizen's League – described their worries in a motion to the Federal Energy Regulatory Commission, which was considering the dam's relicensing.

The environmentalists wanted federal officials to require modifications including building a concretearmored spillway rather than leaving it a concrete "lip" above an unprotected hillside prone to erosion damage. They warned that given the spillway's design, possible uncontrolled floodwaters "could not only cause additional damage to project lands and facilities but also cause damages and threaten lives in the protected floodplain downstream."

State officials who manage the dam dismissed those concerns at the time, and federal regulators are still considering the license renewal. But the warnings aired more than a decade ago have turned out to be well-founded, as officials have ordered entire towns evacuated and Gov. Jerry Brown has declared an emergency.

Ron Stork, a senior policy advocate with Friends of the River, said the current emergency is precisely what he had feared. "Our combined judgement at the time was that the Oroville Dam complex could not be used safely or confidently to conduct flood control operations," Stork said in an interview Monday. He said the environmental groups had demanded "a proper spillway." "There isn't one. It's a spillway lip, a little bump on the top of a hill," Stork said, explaining that having the bare hillside below the emergency spillway allows for major erosion damage to the hillside when water pours over as it did on Sunday. Oroville Dam, which stands 770 feet high, is the tallest in the United States. It's also California's second-largest reservoir, after Shasta Lake, and the largest in the State Water Project, a network of canals and pumping stations that move water from Northern California to the Central Valley and Southern California. It's one of the key reservoirs in the system that stores water for the dry spring and summer months.

Building a concretearmored spillway would have required water districts that rely on the State Water Project to absorb some increases in the costs of water, and Stork said they didn't want to do that at the time. "They didn't want to pay for a second spillway, which almost failed last night," Stork said. And as for state regulators, he said, "what they said is that the existing spillway is safe."

The environmental groups' warnings about the dam's emergency spillway were first reported by the San Jose Mercury News.

John Onderdonk, a senior civil engineer in the Federal Energy Regulatory Commission's Division of Dam Safety and Inspections, responded to the concerns in a memo on July 27, 2006, saying the emergency spillway's design complied with the

commission's engineering guidelines. "Our evaluation indicates that, in the rare event of a discharge, the emergency spillway would perform as designed," Onderdonk wrote. "Emergency spillway flows would flow down a channel consisting of soil, bushes, and trees covering bedrock. Erosion of one to four feet of soil cover, and debris flow… would occur during a large release in the emergency spillway."

He pointed out, however, that flows down the spillway would be directed away from the dam itself and "would not affect reservoir control or endanger the dam." The hydroelectric dam's federal license expired on Jan. 31, 2007. Since then, the California Department of Water Resources has operated the dam under temporary annual licenses issued by the Federal Energy Regulatory Commission.

"The relicensing process requires a variety of state and federal agencies to issue permits and other documents," said Celeste Miller, a spokesperson for the federal commission. "We have just, in December 2016, received all the necessary permits and other documents we need before issuing a final decision on the application."

According to a state dam safety report, the most recent inspection of Oroville's main spillway didn't include a close examination of the structure. The July 2015 report by the Division of Safety of Dams states that "a visual inspection from some distance indicated no visible signs of concrete deficiencies."

Chris Orrock, a spokesperson for the division, said it was unclear why the dam spillway was not more closely inspected. Oroville Dam, located in the Sierra foothills east of the Sacramento Valley, was completed in 1968 – a middle-aged reservoir in a state where many other dams were built between the 1920s and 1950s.

The reservoir rose rapidly this winter as the Feather River and its tributaries gushed down swollen after heavy rain and snow. The storms, which came after more than five years of severe drought, have led officials to release water from dams across Northern California.

A gaping hole appeared in Oroville Dam's main spillway last week, and then water began pouring over the emergency spillway for the first time in the reservoir's history.

While the dam itself remained intact, erosion damage to the emergency spillway over the weekend raised the potential of the structure failing and unleashing a dangerous torrent of floodwaters.

Trying to head off a disaster, state officials increased the flow down the main spillway on Sunday night, and on Monday the lake's level was dropping. The town of Oroville and other communities downstream remained under evacuation orders due to the threat of flooding.

Officials said they hoped their increased use of the main spillway would help save the backup spillway. They used helicopters on Monday to drop boulders into damaged areas of the emergency spillway.

More storms are headed for California this week, and forecasters say they will be strong enough to bring 2 to 6 inches of rain to Oroville.

Michael Dettinger, a hydrologist with the U.S. Geological Survey, said the coming storms plus the heavy snowpack in the mountains above the reservoir make for an emergency that won’t ease anytime soon.

Bell Canyon homeowners reject water rate increase

KATHLEEN WILSON
Ventura County Star 2/14/2017

Residents of the Bell Canyon gated community have rejected an increase in water rates in a protest vote, a move that is allowed under a state initiative but that almost never succeeds.

Ventura County Public Works Director Jeff Pratt said customers sent 400 letters of protest on the increase, more than the majority required in the waterworks district that serves the residential area.

Pratt said he has never seen a protest vote succeed in a county-controlled water district.

'It is the first time this has happened in the almost 18 years I have been here,' Pratt said Monday.

He anticipated that postponing the increase could ultimately cause rates to rise more sharply in the future.

'They have healthy reserves so we can ride out another year,' he said.

Residents of Bell Canyon own large lots and tend to be heavy users of water. They averaged about 40,000 gallons a month last year in the remote area by the Los Angeles County line, Pratt said.

By comparison, residents in Moorpark average 18,700 gallons a month in the summer, when water demands often rise. In Lake Sherwood, the average use was 47,124 gallons a month last year.

Based on that use and rates, the monthly bill in Bell Canyon would have increased from $254 to roughly $290, an increase of 14 percent or $36.

The Bell Canyon area numbers about 2,100 people and had an estimated median household income of $208,571, according to government estimates for the 2011-15 time period.

The rate increase was headed for the floor of the Ventura County Board of Supervisors on Tuesday, but managers withdrew it after learning of the protest vote in the middle of last week.

Pratt said a citizens advisory panel unanimously supported the increase but the Bell Canyon homeowners association and a community services district opposed it.

In an email to Supervisor Linda Parks, leaders of the organizations said assumptions for the rate increases needed to be clarified and people who conserved were being penalized with higher rates.

'Please realize that many in the Canyon gave up lawns, spent small fortunes on alternative landscapes, reduced household consumption etc, to conserve water, just to be penalized for same,' the email says. Officials said rates increase with

conservation because fixed costs must be spread over a smaller quantity. County Water and Sanitation Director Michaela Brown said the increase was driven mainly by the rising cost of imported state water.

The district cannot give customers a break based on conservation because a state appeals court ruling prohibited it in 2015, officials said. The court said rates must be based on the cost of the service. Parks said officials will look at the increase to see if using reserves is acceptable. 'From a fiscally conservative perspective, you don't want to deplete your reserves to zero,' she said.

Reserves are projected to decline below the target of $1 million by the 2018-19 fiscal year. Without the rate increases, cash reserves will be depleted by July 2019, a report says.

Pratt said the rejection of the rate increases won't affect rate-payers in other districts.

Oxnard water rates will go up starting March 15.

STAR FILE PHOTO

U.S. dams are aging and many don't have emergency action plans

BENJAMIN SPILLMAN, TRACY LOEW AND JILL CASTELLANO

USA TODAY NETWORK-CALIFORNIA
Ventura County Star 2/14/2017

As the nation's 84,000 dams continue to age, a growing number of people downstream of these structures are at risk, according to experts and data of the nation's dams.

It's a problem highlighted this week as nearly 200,000 people evacuated the area near California's Oroville Dam, which suffered a potential failure of its emergency spillway. The USA TODAY NETWORK reviewed the latest data in the National Inventory of Dams, which is compiled by the Army Corps of Engineers and shows 15,498 dams across the United States are characterized as high hazard, meaning the loss of at least one human life is likely if the dam were to fail. The average age of the 84,000 dams in the country is 52 years old, according to a 2013 report by the American Society of Civil Engineers. 'The nation’s dams are aging and the number of highhazard dams is on the rise. Many of these dams were built as low-hazard dams protecting undeveloped agricultural land. However, with an increasing population and greater development below dams, the overall number of high-hazard dams continues to increase.'

Among those high hazard dams, 2,912 lack an emergency action plan, a document dam owners maintain that includes critical information such as emergency contacts, details about the dam and an inundation map. “If you have a good emergency action plan, you are going to reduce the consequences if the dam fails,” said Lori Spragens, executive director of the Association of State Dam Safety Officials.

The Oroville Dam is scheduled to be inspected once a year, but according to available data the last two times it was inspected were 2015 and 2012, according to the National Inventory of Dams.

Overall, as of January 2016, 710 dams out of the 1,585 dams in California, nearly 44 percent, had not been inspected within their scheduled inspection frequency.

“We can’t seem to get the federal government or the states interested in funding the most fundamental part of what makes us go, which is infrastructure,” Spragens said. “It just needs so much more attention at a national level.”

In seven states, more than half of high hazard potential dams are operating without emergency action plans, according to the National Inventory of Dams:

» In South Carolina, it’s 96%.

» Mississippi, 88% » Rhode Island, 82% » Alabama, 79% » New Mexico, 61% » Florida 58% » North Carolina, 57% Only three states – Tennessee, Maine and

Louisiana -- and Puerto Rico have emergency plans in place for all high hazard potential dams.

In California, the problem is especially widespread.

California has 1,585 dams, according to the National Inventory of Dams database. Fifty-two percent of those dams are considered a high hazard, the fourth-most of any state.

Records show frequency of inspection varies widely.

In Sonoma County 82 percent of the 65 dams haven’t been inspected on schedule. In San Bernardino County that number was 8 3 percent of 4 0 dams. In Butte County, home of Oroville Dam, nine of 29 dams, or 31 percent, are behind schedule for inspection, records show.

Records also show 75 of 105 dams in Los Angeles County are overdue for inspection and 20 of 28 in Sacramento County.

The problems go beyond Oroville and California.

In October after Hurricane Matthew made landfall water breached or severely damaged dozens of dams in South Carolina.

Nationwide, only 17 percent of dams are considered high hazard.

Oroville Dam: Local airmen on standby

CHERI CARLSON
Ventura County Star 2/14/2017

Crews from the local California Air National Guard were on standby Monday to help with the emergency in Oroville.

Officials said Sunday that an eroding spillway at the Oroville Dam was at risk of failing and issued evacuation orders for nearby communities. About 180,000 people fled their homes. Personnel and equipment from the 146th Airlift Wing at the Channel Islands Air National Guard were told to keep their phones nearby in case they are needed.

The message went out late Sunday afternoon. 'We were all at our monthly drill weekend,' said Maj. Kimberly Holman, public information officer for the unit stationed near Point Mugu.

About 1,200 personnel were at the station just getting ready to go home Sunday when they got word they might be needed in Oroville.

'They sent out a text letting everyone know that this was happening and to please keep your phone nearby,' Holman said, who was on her way to Oroville on Monday to help.

Aircraft with the California Air National Guard 146th Airlift Wing during a wildfire training day last year.

STAR FILE ART

Race against Mother Nature

Officials scramble to stabilize Oroville crisis as storms loom

A VIEW of Lake Oroville, which was filled to near capacity. Damage to the spillways forced officials to make tough calls to avert flooding. (Elijah Nouvelage Getty Images)

By Chris Megerian, Bettina Boxall, Melanie Mason and Laura J. Nelson
LA Times 2/14/2017

OROVILLE, Calif. — With more storms expected to slam Northern California later this week, officials worked frantically Monday to drain water from brimming Lake Oroville in hopes of heading off a potentially catastrophic flood.

The operators at America's tallest dam found themselves in a precarious position Monday, with both of the spillways used to release water compromised and the reservoir still filled almost to capacity after a winter of record rain and snow. Meanwhile, tens of thousands of evacuated residents downstream of the dam still have no clear word when they can return home.

Officials sent millions of gallons of water per minute down the massive reservoir's main spillway. Engineers said that despite a huge gash that opened in the concrete channel a week ago, it was their best option for lowering the dangerously high lake level.

They hoped this would avert further use of the emergency spillway, where damage was discovered Sunday afternoon.

“It was the lesser of two evils,” state Department of Water Resources spokesman Eric See said Monday. “We didn’t want to have more damage, but we needed to evacuate water.”

The emergency spillway suffered severe erosion the day after water cascaded down the unpaved hillside for the first time since the dam opened in 1968.

The damage occurred even though the spillway was designed to handle much more water than the amount that overflowed. Some questioned why officials didn’t heed suggestions more than a decade ago to fortify the emergency spillway.

When it appeared the erosion could quickly worsen Sunday afternoon and potentially undermine the spillway’s concrete lip — a scenario that could unleash a massive wall of water — officials ordered more than 100,000 people to evacuate the low-lying areas along the Feather River.

Racing against Mother Nature, water resources officials Monday sent water surging down the concrete main spillway — a move that lowered the lake level by several feet but threatened to widen the gash. Erosion on the main spillway so far was manageable, See said.

“I’ve been doing these flood battles since 1978,” said state Sen. Jim Nielsen (R-Gerber). “This is the one with the greatest potential for damage of all the ones I’ve dealt with.”

Both spillways are separate from the Oroville Dam itself, which officials say is not in danger of collapsing.

Officials said they want to lower the lake 50 feet by Wednesday to avoid another overflow on the damaged emergency spillway. If the head of the spillway crumbles, a 30-foot wall of water could go crashing down the hillside into the Feather River and toward Oroville, Marysville and Yuba City.

“Obviously any rain this week is not helpful at all,” said Tom Dang, a National Weather Service meteorologist in Sacramento.

On Monday, geysers of water shot from the placid lake and down the concrete spillway, like a water slide the width of a freeway.

Helicopters flew overhead and dump trucks shuttled across the top of Oroville Dam, carrying loads of rock to fill the eroded section. Without reinforcements, water could creep beneath the lip, causing it to crumble and allowing water to gush over the side.

In a letter Monday, Gov. Jerry Brown asked the Trump administration for a federal disaster declaration, saying the problems were likely to be more than local and state officials can handle.

Brown told reporters that he spoke to a member of the president's Cabinet on Monday, but declined to say which one. "My office has been in touch with the White House," Brown said. "I think that will be sufficient."

The Federal Emergency Management Agency, meanwhile, sent a team to help California officials prepare for potential flooding.

"We are trying to plan for the worst-case scenario," said Ahsha Tribble, acting regional administrator for FEMA's Region 9, which includes California. "It's not a wait-and-see game."

Lake Oroville is the keystone of the State Water Project, which sends Northern California water hundreds of miles south to the southern San Joaquin Valley and the Southland.

During much of the five-year drought, the lake level was far below normal. But an extraordinarily wet winter filled the lake so close to capacity that officials have been forced to release water to prevent flooding.

A series of powerful storms on Feb. 7 sent runoff rushing into the reservoir, just as the hole appeared in the main spillway. Managers slowed the release of the water, and on Saturday, Oroville overflowed.

Earth and weak rock near the top of the spillway started to erode, when peak flows were 12,600 cubic feet per second, compared with the designed capacity of 450,000 cubic feet per second, according to the Department of Water Resources. The erosion happened so quickly that officials feared the concrete wall would be undermined and ordered evacuations in Butte, Yuba and Sutter counties that remained in effect Monday night.

Bill Croyle, the acting director of the Department of Water Resources, said Monday that he was "not sure anything went wrong. This was a new, never-happened-before event."

But during 2005 relicensing proceedings for Oroville Dam, several environmental groups argued that substantial erosion would occur on the hillside in the event of a significant emergency spill. In a filing, they asked the Federal Energy Regulatory Commission to order the state to "to armor or otherwise reconstruct the ungated spillway."

State Water Project contractors, including the Metropolitan Water District of Southern California, were involved in the relicensing. MWD General Manager Jeffrey Kightlinger said Monday his agency deferred to the state and federal agencies.

“They did look at that issue and they determined that [the existing emergency spillway] did meet the appropriate FERC guidelines,” Kightlinger said. “In the FERC guidelines, they talk about how you don’t put a lot of funding and concrete, etc. into emergency spillways because presumably they will rarely if ever be used.”

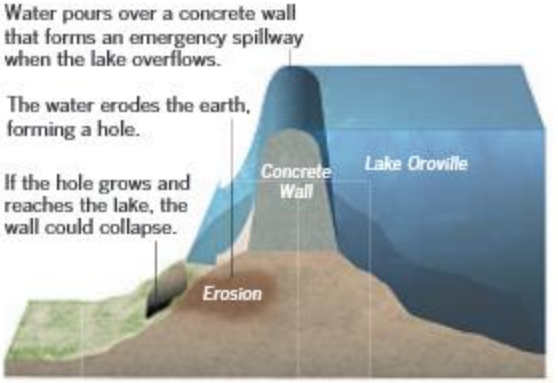
“We did not say it was a cost issue,” he added.

Brown, after meeting with advisors at the state’s emergency operations center near Sacramento, was asked by reporters about the concerns raised in 2005 about Oroville’s spillway system.

He said he welcomed calls for more scrutiny. “We’re in a very complex society where things can go wrong,” he said. “When they do, they ripple out and affect hundreds of thousands and in some cases millions of people.”

Times staff writers John Myers in Sacramento and Veronica Rocha, Joseph Serna and Rong-Gong Lin II in Los Angeles contributed to this report.

The erosion that could lead to a collapse at Lake Oroville



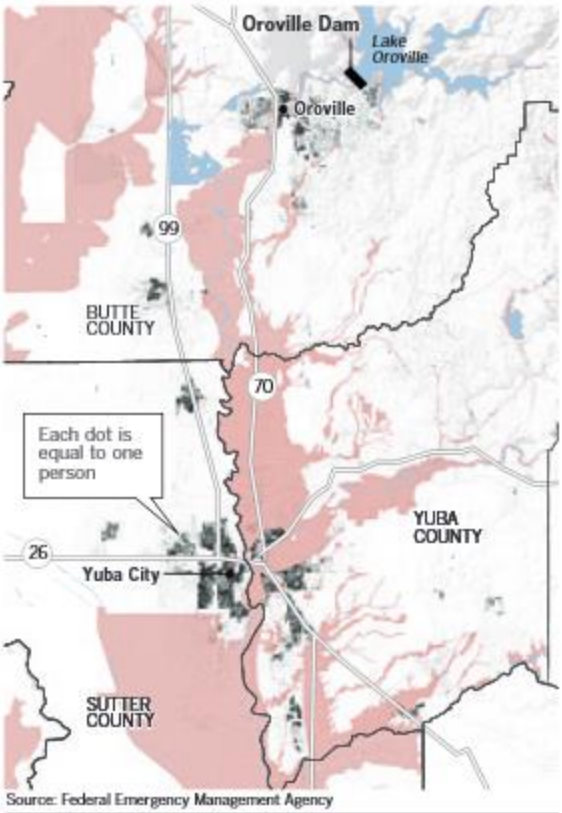
Source: DWR. Graphics reporting by Kong-Gong Lin II, Chris Megerian

Raoul Rañoa Los Angeles Times

Flood zone

The map below shows potential areas at risk during a major flood event. It is unclear how far downstream potential flooding could occur if an emergency spillway at Lake Oroville fails.

100-year floodplain assessment



Source: Federal Emergency Management Agency

Kyle Kim and Jon Fox Los Angeles Times

Under threat of deluge, evacuees wait to go home

OROVILLE residents Bill O'Kelley, 86, and his wife, Doris, 84, sit next to a flagpole at an evacuation center at the Silver Dollar Fairgrounds in Chico, Calif. (Brian van der Brug Los Angeles Times)

By Melanie Mason, Paige St. John, Chris Megerian and Hailey Branson-Potts
LA Times 2/14/2017

OROVILLE, Calif. — As Doris O'Kelley rushed out of her Oroville home Sunday night, one question burned in her mind: When would she be able to return?

By Monday afternoon, she hadn't received an answer to that question — or to many others she had about what was happening at rain-swollen Lake Oroville, where concerns remained that a spillway could fail and unleash a 30-foot-high wall of water.

After an uneasy night on a cot at an evacuation center in Chico, O'Kelley, 84, was itching to get home. She was unimpressed with information provided by officials, which she described as technical jargon that was of little help.

"I'd like to see them be a little more plain about what's going on," O'Kelley said.

The evacuations of more than 100,000 people from communities downstream of Lake Oroville on Sunday night — in the counties of Butte, Yuba and Sutter — were abrupt

and frantic. By Monday, a sense of frustration and wait-and-see uncertainty had settled in.

There are forecasts of more rain later this week, which added new urgency to the state Department of Water Resources' frantic efforts to reduce water levels at Oroville Dam — where both an unpaved emergency spillway and the main concrete spillway are damaged. For evacuees, the predicted storms heightened their unease as they waited to see when it would be safe to go home.

Rain is expected to begin falling late Wednesday and continue through the weekend, said Tom Dang, a National Weather Service meteorologist in Sacramento. At least 3 inches is expected to fall on Oroville, while the surrounding mountains and foothills could get up to 8 inches by Monday.

"Obviously, any rain this week is not helpful at all," Dang said.

At an afternoon news conference, Butte County Sheriff Kory Honea said authorities were working on a "repopulation" plan for evacuees, but there was no timeline for lifting the evacuation orders. He defended his decision to call for evacuations over the weekend.

"I recognize and absolutely appreciate the frustration people who were evacuated must feel," Honea said. "It wasn't a decision I made lightly."

His department had to move more than 500 inmates from the Butte County Jail in Oroville to an Alameda County lockup, where they were to be held for the time being, he said.

At the Chico evacuation center at the Silver Dollar Fairgrounds, volunteers worked doggedly to lighten the mood. There were arts and crafts tables, a rolling book cart, valentine cookies.

"All these people are displaced, and it's really sad when you just go around and look and see … the elderly people and the people that need medication and medical attention," said Vince Haynie, a volunteer with the Rhema Word of Faith ministry who was delivering blankets and baby supplies. "They displaced people at the drop of a dime."

Isaac Loseth, 18, said the atmosphere Sunday night at the fairgrounds was "hectic" and "uptight." He slept in his grandparents' RV in the parking lot and worried about his home. Loseth lives near the Thermalito Afterbay, a reservoir about 13 miles southwest of Oroville Dam. If the levees around Thermalito were to breach, he said, "our house would be flooded."

He was feeling better Monday as he walked his dog, Rose, through the fairgrounds. He conceded that although he wanted to go home, he understood why authorities were being cautious with the evacuation orders.

“I think they made the right call as a safety precaution,” Loseth said. “Better safe than sorry.”

The sudden evacuations Sunday night were marked by frantic, all-caps messages from authorities.

“This is NOT A Drill. This is NOT A Drill. This is NOT A Drill,” read a Butte County Sheriff’s Office statement posted on social media.

“DO NOT TRAVEL NORTH TOWARD OROVILLE!!!!!” the Yuba County Office of Emergency Services warned.

On Monday, abandoned cars sat along many of the evacuation routes — remnants of the panic and massive gridlock that seized the region within hours of the evacuation orders. Some people said they hopped into other people’s vehicles during traffic standstills.

Some residents from the adjacent towns of Marysville and Yuba City said they had been confused about Sunday’s evacuation orders. Both Sutter and Yuba counties had called for mandatory evacuations, but the town of Yuba City declared a “voluntary” evacuation.

Because winter floods are common in the Feather River basin downstream from Oroville Dam, many locals in the low-lying valley simply drove to higher ground. “It’s in the DNA, “ said Chuck Smith, a Sutter County spokesman.

Marysville, which is protected from the flooded Feather River by a system of levees, rice fields and other low-lying areas, bore witness to the relentless push of water. Tombstones at Marysville Cemetery were underwater. So were soccer fields at the town’s riverfront park, where the white tops of goal nets were barely visible above the muddy swirl of water.

At a Red Cross shelter at Sutter Union High School in the tiny town of Sutter, Steve McHughes, 39, said he was consigned to his fate and prepared to stay “as long as it takes.”

It took his family of seven nearly five hours to reach the shelter from their home in Live Oak on Sunday night — a drive that usually takes 25 minutes. Along the way, they saw angry travelers hurling threats at a gas station owner who was trying to shut down his pumps.

When the family reached the shelter, all of the cots were filled and there was no room for their three dogs. They spent the night sleeping in three vehicles.

Bruce P. Watson, an Air Force retiree, had been staying in a motel in Yuba City when the evacuations were ordered. He hadn't planned to leave and locked his door.

The motel manager found him there Monday morning, and a maintenance worker drove him to the shelter in Sutter. There, the 65-year-old sat in the afternoon sun, in flannel pajama bottoms and slippers, with a six-pack of beer hanging from his walker.

"I said, 'Oh, well,' " Watson said. He had no clue what would happen next.

"Wait," he said. "That's all I can do."

In Oroville, gas stations throughout town were packed Monday with people who hadn't evacuated and were trying to fill their tanks while they still could. At one, Zac Odom, a 44-year-old nurse, said he and his family knew about the orders but chose to stay anyway.

"I'm a hardcore Christian," he said. "I knew God didn't establish Oroville to get washed away by this dam."

Sheriff's deputies had come to the Oroville house where Odom was staying with his children, his mother and his aunt. They packed up their Toyota, but it was leaking oil, so they decided to stay. Deputies returned later, but the family was stealthy.

"We turned all the lights off and laid low," Odom said. "We just sat there praying."

Mason reported from Chico, St. John from Marysville, Megerian from Oroville and Branson-Potts from Los Angeles. Times staff writer Joseph Serna contributed to this report.

Photographs by Brian van der Brug Los Angeles Times

COUA THA, an Oroville evacuee, prepares a meal for her family in the parking lot at the Silver Dollar Fairgrounds in Chico.

FLOODWATERS inundated the cemetery in Marysville, Calif. At the town's riverfront park, the tops of soccer nets were barely visible above the muddy water.

Rising alarm at Oroville Dam

LA Times Editorial
2/14/2017

Southern Californians have been drinking from the Feather River — and washing in it, flushing with it and sprinkling it over their lawns — for nearly a half-century without giving it much thought, so the emergency at distant Oroville Dam provides a jolting reminder of our dependence on the wetter, northern part of the state. A disaster there could easily become a crisis here.

Oroville is the linchpin of the State Water Project, the massive engineering feat that brings northern Sierra water from the Feather River to the Sacramento River, through the Sacramento-San Joaquin River Delta, into the California Aqueduct, over the Tehachapis and to our faucets. This season's storms have filled the dam to capacity, so managers diverted water onto a concrete spillway to keep it from topping the earthen dam itself. When damage to the spillway was spotted, water managers switched to an unpaved, and previously unused, emergency spillway — but the water releases carved up the hillside, sending debris down the Feather River, threatening further erosion and prompting the evacuation of more than 100,000 residents downstream, including in Yuba City, Marysville and once-remote towns and cities that are increasingly becoming commuting suburbs for greater Sacramento.

California is an extremely engineered environment. Decades ago, the natural state of affairs in years like this one had been flooding in the Sacramento and San Joaquin valleys. Since 1960, the State Water Project has helped to protect Northern California cities, towns and farms from floodwaters while providing usable water to Central Valley farms and Southern California homes. Ratepayers here, as elsewhere, help keep the system in repair. The project binds Californians to one another, despite the difference in precipitation between the wet north and the dry south. A catastrophe at Oroville Dam — for example, spillway-loosened detritus blocking flow to the delta — could cause a water-supply emergency here, despite all the rain.

Engineers (and taxpayers and ratepayers) have provided Southern California useful redundancy in water delivery systems. Los Angeles gets water via William Mulholland's Owens Aqueduct and later extensions, and the region relies heavily on Colorado River and Lake Mead. But import of Owens water has been limited to mitigate environmental damage east of the Sierra, and the water level at Lake Mead remains so low that delivery cutbacks may be on the horizon.

There will likely be lessons learned from the emergency at Lake Oroville about how the state should manage water, but it is too early at this point be certain what they are.

Meanwhile, Californians will have to keep the names and distant places — the Feather River, the Oroville Dam, the Owens, the Colorado, Lake Mead — in the forefront of their minds as we make decisions to sustain, supplement or abandon the water projects that have made the state what it is today.

A terrifying wall of water

The prospect of a collapse at nation's tallest dam spurred a mass evacuation.

A DUMP TRUCK crosses the primary spillway at Oroville Dam to deliver boulders to the reservoir's emergency spillway, which had never been used since the dam was completed in 1968. This last weekend was its first test, after erosion damaged the facility's main spillway. (Photographs by Brian van der Brug Los Angeles Times) OROVILLE RESIDENTS Desiree Garcia and her daughter, Kay'lee Pearl Garcia, 3, look over donated clothing at an evacuation center in Chico, Calif. ()

By Rong-Gong Lin II, Raoul Rañoa and Chris Megerian
LA Times 2/14/2017

OROVILLE, Calif. — Any dam engineer would be terrified of this nightmare scenario: the possible collapse of a retaining wall in California's second-largest reservoir.

That's the prospect officials faced when they ordered more than 100,000 people evacuated downstream of the nation's tallest dam Sunday.

It occurred insidiously: a pocket of erosion that crept ever closer to a low concrete wall that was supposed to be the last, best defense against disaster.

The threatened concrete structure, called a weir, was designed as an emergency escape route of sorts for rapidly rising waters at swollen Lake Oroville. By allowing

some water to spill over its shoulders, the concrete wall would relieve tremendous pressure building on Oroville Dam itself, which is nearby.

This concrete wall is the key feature of Lake Oroville's emergency spillway, and it had never been used since the dam was completed in 1968. This last weekend was its first test, however, after erosion caused major damage to the facility's main spillway.

It wasn't long after water began flowing over the weir, however, that the emergency spillway revealed a major weakness: An area of earth downhill from the weir had begun to erode and the erosion was creeping uphill, closer to the concrete wall.

If enough earth washed away, the hole would undermine the wall and breach it, releasing a 30-foot wall of water on the valley below.

In other words, millions of gallons of uncontrolled water would begin to pour down the Feather River, the largest tributary to California's largest river, the Sacramento, overwhelming towns along its banks.

"Imagine the little Dutch kid with the finger in the dike," said Chris Orrock, spokesman for the California Department of Water Resources. In the story, the child saves the countryside by plugging up the hole that keeps water from rushing in to flood the region.

"Once the erosion hits the water, then it's uncontrolled," Orrock said. "And when that starts flowing, you can't stop it."

Fortunately, within about 90 minutes after state water officials decided to dramatically accelerate the draining of water through Lake Oroville's damaged main spillway, the erosion on the emergency spillway slowed down.

By late Sunday night, the lake's water level had fallen below the weir and water was no longer flowing over the emergency spillway. The erosion had stopped.

Lin reported from San Francisco, Rañoa from Los Angeles and Megerian from Oroville, Calif.

OROVILLE RESIDENTS Desiree Garcia and her daughter, Kay'lee Pearl Garcia, 3, look over donated clothing at an evacuation center in Chico, Calif.

BRIAN VAN DER BRUG Los Angeles Times

WARDENS from the California Department of Fish and Wildlife watch as water from Lake Oroville cascades out of the reservoir's damaged primary spillway at 100,000 cubic feet per second. More than 100,000 people were evacuated downstream of the state's second-largest — and nation's tallest — dam Sunday.

Frantic fight to avert Central Valley flood

Authorities work frantically to lower lake's water level to avert major flood.

ALEJANDRA MENDOZA, 6, right, plays Old Maid with her cousin Liset Lopez, 13, on their second night at the Bangor Community Hall after families downstream from the Oroville Dam were ordered to evacuate. (Brian van der Brug Los Angeles Times)

By Rong-Gong Lin II
LA Times 2/14/2017

SAN FRANCISCO — California officials are frantically trying to rapidly reduce water levels behind Oroville Dam — the nation's tallest — after issuing evacuation orders for more than 100,000 people who live downstream.

Here's an explainer for the current crisis, and how authorities are racing to prevent catastrophic flooding from affecting the Central Valley.

What is the biggest concern?

The biggest concern was that a concrete wall, built atop a hillside, that keeps water in Lake Oroville — California's second-largest reservoir — would suddenly crumble Sunday afternoon, threatening the lives of thousands of people by flooding communities downstream.

With Lake Oroville filled to the brim, such a collapse could have caused a “30 foot wall of water coming out of the lake,” Cal-Fire incident commander Kevin Lawson said Sunday night.

What is so special about this concrete wall?

This particular concrete wall was chosen to act as an emergency spillway for Lake Oroville — a pathway for excess water to drain when the reservoir is filled to the brim.

If Lake Oroville became too full, and a main concrete spillway couldn’t drain the reservoir fast enough, water would then empty out of this emergency spillway, flowing over this low concrete wall — known as a weir — washing past a roadway and down a tree-lined hillside.

The emergency spillway was designed so that water would always drain at this location when the dam was full. That would keep Oroville Dam, built at a different location, safe from being overtopped by water.

So on Saturday, rising reservoir water put the emergency spillway to use for the first time since Oroville Dam was completed in 1968.

When did officials realize something was terribly wrong?

Officials had thought things were going fine until suddenly, on Sunday afternoon, authorities were alerted to what they described as erosion developing near the emergency spillway.

The erosion was occurring so fast that officials feared the concrete wall would be undermined, and that it would cause a catastrophic release of water downstream. Officials said they couldn’t wait to act if the worst-case scenario struck, and ordered sweeping evacuations.

What has happened since the evacuations were ordered?

The situation has improved. There has been no catastrophic collapse of the concrete wall on top of the emergency spillway, which would have resulted in an overwhelming release of water downstream.

Officials decided to focus their efforts on draining the lake to funnel more water down the main spillway, a concrete slide that is supposed to be the primary way of draining a full Lake Oroville.

The main spillway itself was hobbled last week, as parts of it began disintegrating as a giant pothole formed underneath a section.

Authorities knew they had to take pressure off the emergency spillway, so they began sending more water down the main spillway late Sunday.

They increased the flow from 55,000 cubic feet per second to 100,000 cubic feet per second, and hoped for the best.

They were in luck Sunday night. The increased flows did not appear to damage the main spillway further. And before midnight, the main spillway had drained the lake enough so that water was no longer flowing down the emergency spillway.

The dry weather early this week helped. As of Sunday night, only 40,000 cubic feet of water per second was flowing into Lake Oroville, and because 100,000 of cubic feet of water per second is flowing out, lake levels are being reduced.

What comes next?

Officials are hoping to drain as much water as they can before a new round of storms is forecast to arrive in Northern California later this week.

If officials believe they can send an even faster torrent of water down the main spillway, they will, said Bill Croyle, the acting director of the California Department of Water Resources.

What level should Lake Oroville be before officials start feeling better?

At the height of the crisis on Sunday, the lake was topped out at 902 feet. Officials would like the lake to fall by an elevation of 50 feet.

Why is it a bad sign to use the emergency spillway?

It’s a bad sign because officials don’t have any ability to control how much water goes into the emergency spillway, as can be done with the main spillway.

Authorities want to keep a limit on how fast water flows from Lake Oroville down the Feather River, which runs past Oroville, Marysville and Yuba City before merging with the Sacramento River and heading to California’s capital.

California’s flood control system along Oroville can handle only a speed of 150,000 cubic feet of water per second. If water flows faster than that, catastrophic flooding can happen.

“We don’t like to press it to the edge if we don’t have to,” Croyle said.

Have officials had to push the Feather River to its limit before?

Yes, during the historic 1997 rains. There was flooding in and around the valley, “but we did pass water through this region without too much trouble,” Croyle said.

What happened in 1997?

Several levee breaks were reported in the Sacramento and San Joaquin valleys. But it was nothing compared with the worst-case scenarios envisioned Sunday.

Is there any way this situation could have been avoided?

That’s a question many people will be wondering about for some time. Croyle was asked Sunday why officials didn’t increase the flow down the damaged main spillway earlier.

Croyle said that officials were reacting to the best information they had at the time.

What were they reacting to?

The first situation that officials reacted to was news of the damage in the main concrete spillway Feb. 7. Officials stopped water draining out of the lake to inspect the damage, and studied it to see whether they could fix it.

But “we determined we could not fix the hole,” Croyle said. It was 250 feet long, 170 feet wide, and almost 40 to 50 feet deep. There wasn’t enough time to keep the chute dry and fix it.

Officials thought they had no choice other than to use the main spillway despite its crippled state, even though it would be further damaged by resuming its use.

The result is a balancing act — drain as much water as quickly as possible while trying not to further damage the spillway.

After all, the crippled main spillway needs to last for the remainder of the rainy season.

By Friday, officials had held out hope that they wouldn’t need to use the emergency spillway. But then it rained Friday night.

“It came in a little wetter. The storm system parked over this region of California was parked a little longer,” Croyle said.

It was only after the emergency spillway was revealed to be in dire condition that officials roughly doubled the amount of water flowing out of the main spillway.

By that point, luckily, the deterioration of the main spillway had largely stabilized, although there is still cause for concern.

How much time do officials have before the next rainstorm arrives?

The National Weather Service forecasts Tuesday will be dry and mild, allowing river levels to recede.

Light to moderate rain is expected Wednesday; Thursday is forecast to cause limited rising in rivers.

The situation may worsen by the weekend, however, as new storms arrive. The river could begin rising again as early as Friday, and areawide flooding could happen between Sunday and Feb. 21.

OROVILLE DAM POSES RISK

OLGA R. RODRIGUEZ AND DON THOMPSON ASSOCIATED PRESS
Ventura County Star 2/13/2017

OROVILLE, Calif. - Thousands evacuated their Northern California homes Sunday evening after authorities warned an emergency spillway in the country's tallest dam was in danger of failing and unleashing uncontrolled flood waters on towns below.

About 150 miles northeast of San Francisco, Lake Oroville is one of California's largest man-made lakes, and the 770foot-tall Oroville Dam is the nation's tallest.

At least 130,000 people were asked to evacuate over concerns the dam's emergency spillway could fail.

Hundreds of cars were in bumperto- bumper traffic on highways and at least two shelters said they were at capacity.

Meanwhile, the Ventura County Fire Department on Sunday night was assembling a 14-member swift-water rescue team to assist in Oroville, according to Ventura County Fire Department spokesman Steve Swindle. Several other fire departments from across the state were also mobilizing.

Water flows over an emergency spillway Saturday at the Oroville Dam in Oroville.

CALIFORNIA DEPARTMENT OF WATER RESOURCES VIA AP

The erosion at the head of the emergency spillway threatens to undermine the concrete weir and allow large, uncontrolled releases of water from Lake Oroville, the California Department of Water Resources said. Those potential flows could overwhelm the Feather River and other downstream waterways, channels and levees.

Officials say Oroville Lake levels had decreased by Sunday night as they let water flow from its heavily damaged main spillway but noted that water was still spilling over the dam.

The cities of Oroville, Gridley, Live Oak, Marysville, Wheat land, Yuba City, Plumas Lake, and Olivehurst were all under evacuation orders. The evacuation order went out

around 4 p.m. after engineers spotted a hole that was eroding back toward the top of the spillway.

Butte County Sheriff Koney Honea said engineers with the Department of Water Resources informed him shortly after 6 p.m. that the erosion on the emergency spillway at the Oroville Dam was not advancing as fast as they thought. “Unfortunately they couldn’t advise me or tell me specifically how much time that would take so we had to make the very difficult and critical decision to initiate the evacuation of the Orville area and all locations south of that,” he said.

“We needed to get people moving quickly to save lives if the worst case scenario came into fruition.”

Honea said there is a plan to plug the hole by using helicopters to drop rocks into the crevasse.

Water began flowing over the emergency spillway at the Oroville Dam in Northern California on Saturday for the first time in its nearly 50-year history after heavy rainfall.

Officials earlier Sunday stressed the dam itself was structurally sound and said there was no threat to the public.

Residents of Oroville, a town of 16,000 people, were told to head north toward Chico, and other cities were told to follow orders from their local law enforcement agencies, the Butte County Sheriff’s office said.

Evacuations urged amid flood fears

More than 100,000 are warned after hole forms in 2nd spillway used to lower Lake Oroville's water level.

By Chris Megerian, Paige St. John, Melanie Mason and Bettina Boxall
LA Times 2/13/2017

OROVILLE, Calif. — More than 100,000 people in communities downstream of Lake Oroville were told to evacuate Sunday evening after authorities grew concerned that dangerous flood waters would start surging out of the huge reservoir.

The flood threat emerged suddenly Sunday afternoon when a hole developed in the auxiliary spillway that was being used for an emergency spill to lower the level of the full-to-the brim reservoir, the second-largest in California.

If the erosion advanced quickly uphill, it could undermine the concrete top of the spillway, allowing torrents of water to wash downhill into the Feather River and flood nearby Oroville and other downstream towns.

Kevin Lawson of CalFire said it had threatened to "unleash a 30-foot wall of water coming out of the lake."

But by 10 p.m. Sunday, officials said the immediate threat had passed because water had stopped washing over the emergency spillway.

Nonetheless, the situation at the reservoir remained precarious. The two main avenues for getting water out of the lake — the unpaved emergency spillway and the main concrete spillway — were both damaged.

Both spillways are separate from Oroville Dam itself, which state officials continued to say was not in danger. The main spillway, a long concrete chute off to the side of the dam, has a gaping gash in it that forced officials to reduce releases last week.

That caused the lake to quickly rise with heavy storm runoff, triggering emergency releases down the auxiliary spillway, which consists of a concrete weir at the reservoir's edge that sends flows down a hillside into the Feather River.

Although the emergency spill was small, it started to erode the hillside Sunday afternoon.

"There was significant concern that [the erosion] would compromise the integrity of the spillway, resulting in a substantial release of water," Butte County Sheriff Kory Honea said at a Sunday evening news briefing.

"We had to make a very critical and difficult decision to initiate the evacuation of the Oroville area," he added.

"Immediate evacuation from the low levels of Oroville and areas downstream is ordered," proclaimed a Sheriff's Department statement posted on social media. "This is NOT A Drill."

The order affected rural communities located along the Feather River and included the counties of Butte, Yuba and Sutter. Oroville residents were told to make their way north of the lake to Chico, where an impromptu evacuation shelter had been set up at the fairgrounds.

The Yuba County Office of Emergency Services urged evacuees to travel only to the east, south or west. "DO NOT TRAVEL NORTH TOWARD OROVILLE," the department said on Twitter.

As traffic slowed to a crawl, travelers reported encountering road blocks heading north on California highways 70 and 99. For those headed south, the driving was no easier as thousands poured onto the highways in an attempt to evacuate.

Belen Castaneda, 23, a preschool teacher from Biggs, fled her home around 4:30 p.m. for the Silver Dollar fairgrounds.

"We just grabbed everything we could," she said. "Everyone was freaking out."

Castaneda and her family — three sisters and her mom and dad — drove in two separate cars, bringing along their elderly neighbor who doesn't speak English.

Castaneda said her family took special care to bring irreplaceable items. "Old family pictures we had brought from Mexico that we had for a long time," Castaneda said, "and our birth certificates."

She also grabbed a couple items from her sprawling makeup collection.

"Some of that stuff is limited edition," she explained.

By Sunday night, experts were planning to plug the crevice in the emergency spillway with bags of rocks dropped from helicopters.

They had also doubled discharges down the main spillway to help lower the lake level and reduce the overflow.

Lake Oroville is the keystone of the State Water Project that sends Northern California water hundreds of miles south to the southern San Joaquin Valley and the Southland.

In addition to flooding concerns, if operators can't easily get water out of the lake that could interfere with deliveries to contractors, including the Metropolitan Water District of Southern California.

A series of powerful storms in Northern California sent runoff rushing into the lake just as a gaping hole developed in the main spillway Tuesday, forcing managers to reduce releases.

That pushed the reservoir to overflow Saturday, marking the first time the emergency spillway was used since the dam was finished in 1968. Until Sunday afternoon, it seemed to be going smoothly.

James Nash, 86, heard about the evacuation order from his apartment building manager. A retired chef and Korean War vet, he wasn't sure where to go.

He couldn't get to Chico on his bike. He had a small bag with shaving gear, a washcloth and paper towels. "No blankets. No water," he said.

He remembered the 1997 evacuation order, which he ignored. There was no flooding then and he was pretty sure nothing would happen this time.

"I don't believe it's going to happen," he said.

But he wasn't comfortable enough to go back home, so he kept watching the water in the river below.

On Sunday evening, Christopher Cruz, 21, and his girlfriend, Jessica Isaacson, 18, waited outside of a CVS surrounded by the plastic jugs they had filled with water and the snacks and clothes they'd packed.

Stranded in Oroville, where they rent a room, they had hoped Isaacson's mother would pick them up, but she was stuck in Chico. Finally, they called local law enforcement, who told them to wait outside the pharmacy until someone came for them.

Cruz said that when Lake Oroville started to hit its overflow point a few years earlier, he had thought about packing a bag.

"I just thought everything was going to blow over," he said.

This time, with no car, he and Isaacson had set out walking, only to run into a police officer who told them in no uncertain terms that they were going in a dangerous direction.

"Heading that way is heading for death," he told them.

Times staff writers Anna Phillips and Matt Hamilton contributed to this report.

CAPITOL JOURNAL

A water issue just as dire as drought

GEORGE SKELTON in Sacramento
LA Times 2/13/2017

While President Trump and his California resistors dominate the spotlight, a little outfit without much pizazz is trying to draw state government's attention to sickening drinking water in the San Joaquin Valley.

What's normally heard about water in the parched valley — or read on farmers' crude signs along Interstate 5 and California 99 between Bakersfield and Stockton — is that the federal and state governments have cruelly tightened the irrigation spigots.

Never mind that we're only now emerging from a historic drought, caused not by government but by the supreme rainmaker. And never mind that water also is needed for spawning salmon in the Sacramento and San Joaquin river systems to keep alive the ocean fishing industry.

What's heard about a lot less is that hundreds of thousands of people — mostly low income, and many of them farmworkers — are being forced to drink unhealthy, contaminated tap water unless they can get healthy water trucked in or buy it bottled.

And what the political power structure doesn't like to acknowledge above a whisper is that much of this health problem is caused by farmers' fertilizer and cow manure. There are lots of dairies and beef cattle in the valley, as you may have smelled driving I-5 near Coalinga.

A typical dairy cow produces 33 tons of manure a year, according to the activist Community Water Center, and there are 1.6 million dairy cows in the San Joaquin Valley.

Animal manure and chemical fertilizer produce nitrate that sinks into the groundwater and is pumped up through wells into home plumbing.

An overload of nitrate can cause "blue baby syndrome" — shortness of breath and skin-darkening — miscarriages, stillbirths, premature births, sudden infant death syndrome, diarrhea and cancer.

Forget about boiling the water. That only makes the nitrate worse.

There's also another prime valley poison: arsenic. It occurs naturally in the ground, but is augmented by fertilizers and pesticides. Too much arsenic can cause skin damage, circulatory trouble and cancer, especially among children and pregnant women.

The deeper the well, the more arsenic there is. So that's a huge problem right now. Farmers drilled deeper and deeper during the drought to replace dwindling surface water normally supplied by aqueducts. As aquifers were drained, community and family wells were left high and dry, or producing crud.

Health problems are particularly acute in Tulare County, where more than 90% of residents rely on wells for drinking water. It has above-average death rates for, among other maladies, sudden infant death syndrome, liver diseases and all sorts of cancers, according to the Community Water Center.

The bad drinking water extends throughout the valley — not every place, but too many — and affects an estimated 300 communities.

The small Community Water Center, which sprung up a few years ago in Tulare, is trying to prod the Legislature and Brown administration into paying more attention to the problem.

The group's activists came to Sacramento last week to meet with legislators and reporters, but didn't attract much interest. That's typical of an organization that doesn't wield hefty political clout and can't afford to donate campaign money. The agriculture industry, by contrast, is a well-heeled mover and shaker.

"They're awesome," says Felicia Marcus, chairwoman of the state Water Resources Control Board, referring to the center. "They're not only good at raising an important issue, but very good at empowering local people to speak for themselves."

A co-founder, Laurel Firestone, 38, took an uncommon route to the California farm belt. She grew up in Venice near the beach and in a Washington, D.C., suburb. Her father was a professor and her mother a sculptor. Firestone graduated with honors from Harvard Law School and began working in Brazil on human rights and other issues.

"I decided we've got these same issues in our own state, so how can I work overseas," she says. "I had a law degree for the U.S., not Brazil. I started worrying about challenges in my home state."

She and her attorney husband — a poverty activist — moved to Delano, a far cry from Venice and Harvard.

"There were not a lot of attorneys or services," she says. "There were plenty of people like us in L.A. and the Bay Area. The valley seemed where we could have the most impact."

They lived in Delano about nine years and then moved to the political action in Sacramento.

Unhealthy drinking water is also pumped from wells along the Central Coast and in parts of Southern California, affecting around 1 million people. But larger communities have money to operate water-filtering systems. Most little San Joaquin Valley towns don't.

The state can supply the filtering systems with bond money. But local people need significant funds to operate and maintain them.

"In such a sophisticated state, it's shameful in this day and age that people are living in these conditions," says Wade Crowfoot, who heads the California Water Foundation, another activist group.

The goal this year is to persuade the Legislature to develop funding options — perhaps fees on fertilizer, bottled water and all Californians' water bills.

"I'm for whatever will pass," Marcus says.

One problem: Most San Joaquin Valley legislators are Republicans, and they really don't like anything that smacks of taxes.

Democrats should take some time off from fighting Trump and find a way to supply healthy water for people they profess to care about, including immigrants here illegally.

Water flowing over emergency spillway at tallest US dam

MICHAEL BALSAMO AND RICH PEDRONCELLI ASSOCIATED PRESS
Ventura County Star 2/12/2017

OROVILLE, Calif. Water started flowing over an emergency spillway at the nation's tallest dam, on Lake Oroville, for the first time Saturday after erosion damaged the Northern California dam's main spillway.

Officials hoped to avoid using Oroville Dam's emergency spillway, fearing it could cause trees to fall and leave debris cascading into water that rushes through the Feather River, into the Sacramento River and on to the San Francisco Bay. Crews prepared for several days, clearing trees and brush. Water began running over the emergency spillway around 8 a.m., according to California's Department of Water Resources. It was the first time the emergency spillway has been used in the reservoir's nearly 50- year history. Water was expected to continuing flowing over the emergency spillway for 38 to 56 hours, agency spokesman Eric See said at a news conference Saturday afternoon. In addition to the emergency spillway, water is also flowing through the main spillway that was significantly damaged from erosion, he said. "This is a very unusual event for us here in Oroville," See said. Unexpected erosion chewed through the main spillway earlier this week, sending chunks of concrete flying and creating a 200-foot-long, 30foot-deep hole that continues growing. Engineers don't know what caused the cave-in that is expected to keep getting bigger until it reaches bedrock. Bill Croyle, the Department of Water Resources' acting director, said officials are continuously monitoring the erosion both on site and through cameras. "This is mother nature kind of kicking us a few times here," he said. Croyle said the main spillway will need a "complete replacement" from the damage. Officials noted earlier this week that the cost of repairing the dam could approach $100 million, but they noted the estimate was an early, ballpark figure. Officials have stressed Oroville Dam is sound and there is no imminent threat to the public.

State officials also had been attempting to rescue millions of hatcheryraised fish imperiled by muddy water flowing downstream.

A whole lot of water over this dam

For the first time in Lake Oroville's history, overflow is sent down an emergency spillway.

WATER RUSHES down a hillside from the emergency spillway at rain-swollen Lake Oroville, depositing mud and debris into the Feather River. (Brian van der Brug Los Angeles Times)

By Bettina Boxall and Patrick McGreevy
LA Times 2/12/2017

OROVILLE, Calif. — At 8 a.m. Saturday, a sheet of water began spilling from the brim of California's second-largest reservoir and washing down a partly cleared hill to the Feather River.

It was the first time in the 48-year history of Lake Oroville that the reservoir was so full that it triggered uncontrolled releases down an emergency spillway.

Bloated with storm runoff, the reservoir had gone from 80% full to overflowing in less than a week when managers were forced to reduce releases on Oroville's heavily damaged concrete spillway.

The emergency spillway was doing what it was supposed to do: letting water out of the huge lake so it wouldn't top the dam.

State water officials called the spill a small one and said they expected it to end Sunday or Monday as lake levels dropped below the emergency threshold.

"The flow rates that we see now pose no threat to the dam and no flood threat to downstream waters," said Bill Croyle, acting director of the state Department of Water Resources.

But he made it clear that while this is Oroville's first emergency spill, it may not be the last.

With northern Sierra precipitation levels tracking ahead of the wettest year on record so far this winter, Oroville managers have a nerve-racking several months ahead of them. "There's a lot of snow up there," Croyle observed.

The snowpack in the northern Sierra, which includes the Feather River watershed, is 150% of normal for the date. Statewide it is 180% of average.

Reservoirs around the state are making flood-control releases.

In Mariposa County, the small reservoir behind Mariposa Dam was overflowing, sending water down its spillway for the first time since the 1950s, said Merced County spokesman Mike North. About 25 homes were flooded Saturday by the swollen Mariposa Creek.

This winter's turnaround from five parched years has been dramatic. A year ago at this time, Oroville was slightly less than half full. In 2014, it was a little more than a third full and its receding shoreline served as a vivid symbol of the drought's punishing toll on the state.

But Californians shouldn't be surprised.

"If you look at a map of the U.S. and weather variability, California is the most variable place in the country," said Jeff Kightlinger, general manager of the Metropolitan Water District of Southern California. "This is an extreme. But it's not outside of what we've experienced in the past."

Completed during the administration of Gov. Ronald Reagan, Oroville is the keystone of the State Water Project that sends Northern California water hundreds of miles to the Southland.

As the head of the project's biggest customer, Kightlinger has been anxiously watching since Tuesday, when a hole big enough to swallow a small house opened in the long concrete chute that is the lake's normal spillway.

Dam managers briefly shut down releases and then restarted them at a reduced rate as they struggled to keep the lake from rising to a point that would trip emergency spills.

Friday they thought they had managed to do that. But it rained Friday night. By Saturday the lake level had risen to an elevation of 901 feet — the point at which water started washing over the 1,700-foot-long top of the emergency spillway.

It snaked down the hill, a shallow rippling stream glinting in the sunlight.

Dam managers wanted to avoid that sight for two big reasons. They don't control the emergency releases. Nature does. The spill won't stop until inflow volumes drop below the discharge.

And as the water streams down the hillside, it carries sediment and debris into the Feather River — material that can clog the river channel, the dam's powerhouse and downstream diversion facilities.

Crews worked frantically at the end of the week clearing trees and brush from the water's emergency path. Utility crews used helicopters to remove power lines.

Booms and boats were brought in to collect debris from the pool at the dam's base. More than 10 million salmon were evacuated from the Feather River hatchery downstream because the river water had grown too muddy for them.

Engineers are limiting flows down the damaged spillway so as not to further erode it. But that is also cutting releases, which means that after this emergency spill is over, more may be necessary to counter runoff in future storms.

Croyle said the state is already studying repair options, including building a new spillway to replace the broken one. But that work can't begin until the runoff season ends. And it will be expensive.

Croyle said that it will cost $100 million to $200 million to fix the spillway — a bill that will largely go to State Water Project contractors, including Metropolitan.

"Obviously down the road, we'll be talking with FEMA and the federal government and the state government about disaster funds," Kightlinger said. "But … there will eventually be a sizable bill for the state water contractors — and ultimately to Metropolitan."

Kightlinger said his agency is volunteering technical and engineering assistance to the state to develop repair plans.

He agreed that Oroville's earthen dam "should be in fine shape." But he said the unprecedented use of the emergency spillway comes with risks of hillside erosion and sending damaging sediment downstream.

"We just hope they make it through this winter without catastrophic damage and go from there," Kightlinger added.

Greg and Doreen Schmidt live in a low-lying area of downtown Oroville, not far from the dam.

"Once it spills over" the emergency spillway, "who knows what's going to happen," Greg Schmidt said. "But it seems like they have it under control."

Nonetheless, Doreen said, "I have my bags packed and I'm on alert."

Ralph Thomas was more sanguine as he watched the roiling dam releases flow under the Table Mountain Boulevard Bridge in Oroville.

"This ain't nothing compared to '97," he said. "Back then the water was almost up to the bridge."

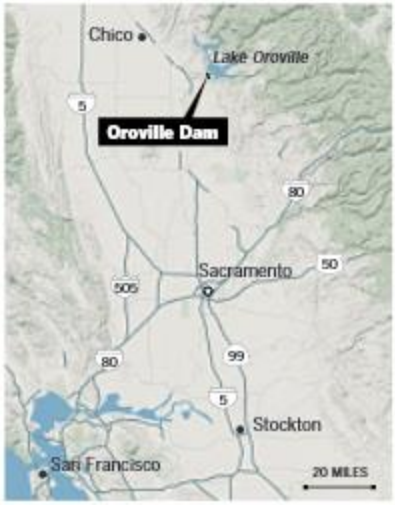
Times staff writer Angel Jennings contributed to this report. McGreevy reported from Oroville and Boxall from Los Angeles.

BLOATED with storm runoff, the Lake Oroville reservoir had gone from 80% full to overflowing in less than a week when managers were forced to reduce releases on the dam's heavily damaged concrete spillway. (Brian van der Brug Los Angeles Times)

UTILITY WORKERS removed transmission lines and insulators as a precaution as water cascaded down an emergency spillway at Oroville Dam. (Brian van der Brug Los Angeles Times)

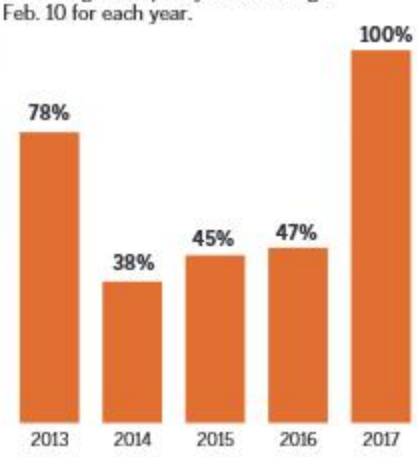
Full to the brim

Damage to Lake Oroville's concrete spillway reduced dam releases last week as high storm runoff poured into the reservoir, filling it to the brim Saturday. That triggered small, uncontrolled releases down Oroville's emergency spillway for the first time in the reservoir's 48-year history.



Lake Oroville storage

Percentage of capacity as of midnight Feb. 10 for each year.



Sources: California Department of Water Resources, Google Earth

Los Angeles Times

Can a cooler L.A. stave off a sizzling future?

Scientists study how to lower the temperature by 3 degrees

SCIENTISTS STUDYING how to lower Los Angeles' average temperatures say planting more trees in unshaded areas is the most effective means of doing so. (Francine Orr Los Angeles Times) GEORGE BAN-WEISS, right, and Arash Mohegh remove a mobile thermometer from a car. (Gary Coronado Los Angeles Times)

By Deborah Netburn
LA Times 2/12/2017

Soak up these rainy days, Southern California. They are not going to last forever.

Summer will be here before you know it, and if recent trends continue, it will probably be a hot one.

Globally, 2016 was the warmest year on record. Here in Los Angeles, temperature records were shattered last summer during scorching heat waves that saw highs of 100 degrees for five days straight.

If you think the city is too hot, you've got company at City Hall. Los Angeles Mayor Eric Garcetti agrees, and he wants to do something about it.

As part of a sweeping plan to help L.A. live within its environmental means, Garcetti has pledged to reduce the average temperature in the metropolis by 3 degrees over the next 20 years.

It's a noble goal. Not only would it make you more comfortable, it would reduce energy consumption and improve air quality. It may even save lives — extreme heat kills more people nationwide each year than hurricanes, floods or tornadoes.

But how do you turn down the thermostat of an entire city in a warming world? And in a place as vast, sprawling and heterogeneous as Los Angeles, how do you measure success?

Local effects

These questions have never been more relevant. L.A.'s heat problem is expected to worsen over the coming decades.

Climate models suggest that by 2050, the temperature in downtown L.A. will exceed 95 degrees 22 days per year. In 1990, only six days were that warm. The San Fernando Valley is expected to see 92 days of this extreme heat per year, compared with 54 in 1990.

Climate change is primarily responsible for the warming trend, but it's not the only force at work. Angelenos are also contending with an additional layer of misery caused by what's known as the urban heat island effect. It means that cities — with their asphalt streets, dark roofs, sparse vegetation and car-clogged roads — are almost always a few degrees warmer than the more rural areas that surround them.

The mayor's plan to cool the region won't compensate for all the effects of climate change.

"We can't geoengineer the atmosphere," said Matt Petersen, chief sustainability officer for the office of the mayor.

But Petersen believes we can do something about the way the city traps heat. By counteracting this heat island effect, he hopes to reduce the amount of warming L.A. will experience in the future.

In early July, Petersen's team convened a group of about 20 civil servants and university scientists to determine how to bring the city's temperature more in line with what it would have been if Los Angeles had never been developed.

"What we are trying to do is create a research collective to help us reach our target," Petersen said. "It's a huge challenge."

The city has already teamed up with USC environmental engineer George Ban-Weiss. A veteran of the Lawrence Berkeley National Laboratory's Heat Island Group, he said there is no better place to test different ways of reducing urban heat than L.A.

"There is all this variation across the city," Ban-Weiss said. "You can't get a richer place to study climate and meteorology."

The built environment is mostly responsible for the problem. More than half of city surfaces are covered by dark pavements and dark roofs. Traditional asphalt absorbs up to 90% of the sun's radiation. As the asphalt gets hotter, it warms the air around it, adding to the overall heat. Even after the sun goes down, that accumulated heat lingers for hours and continues to transfer warmth to the night air.

One way to combat this heat sink is to replace the city's streets and sidewalks with high-tech materials that reflect more sunlight and stay cooler during the day and at night. Some of these "cool pavements" reflect light only in the infrared part of the spectrum, which we cannot see.

In the summer of 2015, the city's Bureau of Street Surfaces tested one of these cool pavements at the Balboa Sports Complex parking lot in Encino. The new surface was approximately 11 degrees cooler than regular pavement in the midafternoon.

Scientists and policymakers are also investigating "cool roofs" and their potential to reduce the overall temperature of the city. Studies have found that in Los Angeles, widespread deployment of cool roofs could reduce the city's temperature by as much as 2 degrees Fahrenheit.

But it's unlikely that a single strategy will be the most effective option for all neighborhoods.

"The heat island effect is a regional phenomenon, and the way you choose your mitigation strategy could vary block to block," Ban-Weiss said.

If an area has no tree cover but lots of cool roofs, adding more cool roofs won't be as useful as planting trees. On the other hand, if an area has lots of trees, adding reflective pavements won't reduce temperatures because the sidewalks don't get much sunlight anyway.

Also, some regions of the city require more cooling than others. The biggest factor affecting temperature in the Southland is the influence of sea breezes. As those winds travel east, they pick up heat from the land and deliver it to those who live inland.

To address the hyper-local nature of the heat island effect, Ban-Weiss and his graduate students are modeling microclimates of areas as small as a few city blocks. They

started with a neighborhood in El Monte, a city that is relatively warm compared with its surroundings.

After painstakingly building a computer model that included each tree and building, the researchers were able to analyze the effects of various heat mitigation strategies, comparing how it would feel if streets had more reflective surfaces, if every grassy yard were shaded by trees, and if every roof were covered in grass.

They found that cool roofs and green roofs had little effect on the thermal comfort of a person walking down the street, and that putting more trees in unshaded areas was the most effective cooling strategy. However, in areas that were already shady, the most significant effect came from cool pavements.

In another project, the team determined that the current zeal for xeriscaping — landscaping with drought-tolerant plants — could make L.A. up to 3.4 degrees Fahrenheit warmer in the daytime by depriving the soil of water and limiting the amount of evapotranspiration that occurs.

“Evapotranspiration works as an air conditioner,” Ban-Weiss said. “When water evaporates, it removes energy from the system and cools it down.”

But at night, different forces are at work: Heat rises from the subsurface of the Earth, moves through the soil and dissipates into the air. Dry soil slows this heat transfer. That means drought-tolerant landscaping could reduce the nighttime temperature by about 5.4 degrees.

Ban-Weiss and his collaborators used computer models to identify regions of Greater Los Angeles that are particularly hot compared with the areas around them (downtown L.A., Northridge), and those that are particularly cool (South Pasadena, San Marino).

Working with heat island researchers at Berkeley Lab and with funding from the state Energy Commission, he is installing about a dozen high-tech weather stations to measure these hot and cool islands and watch how they change over time.

“We’re spending a lot of time and going to a good deal of effort to determine the best places to put these weather stations,” Ban-Weiss said. “We want to make sure that we put them in locations that will measure the heat island effect, and not the signal from the ocean.”

Street research

That’s why two of Ban-Weiss’ grad students spent weeks roaming the streets of Los Angeles with a tube-shaped contraption on the roof of their car. The tube, designed at

Berkeley Lab, holds a needle-thin thermometer that Arash Mohegh and Mo Chen have been squiring around, searching for pockets of heat.

The job is tedious. To get accurate measurements, they spend hours weaving up and down streets in their target neighborhoods. They visited the San Fernando Valley on a particularly scorching day in June.

“We’re about to go from an industrial area to a more residential neighborhood, so we’ll see how the temperature changes,” Mohegh said as Chen steered the car through Chatsworth.

Sure enough, as blocky office buildings gave way to tree-lined streets with green lawns, the dashboard thermometer dropped from 102 to 100 degrees.

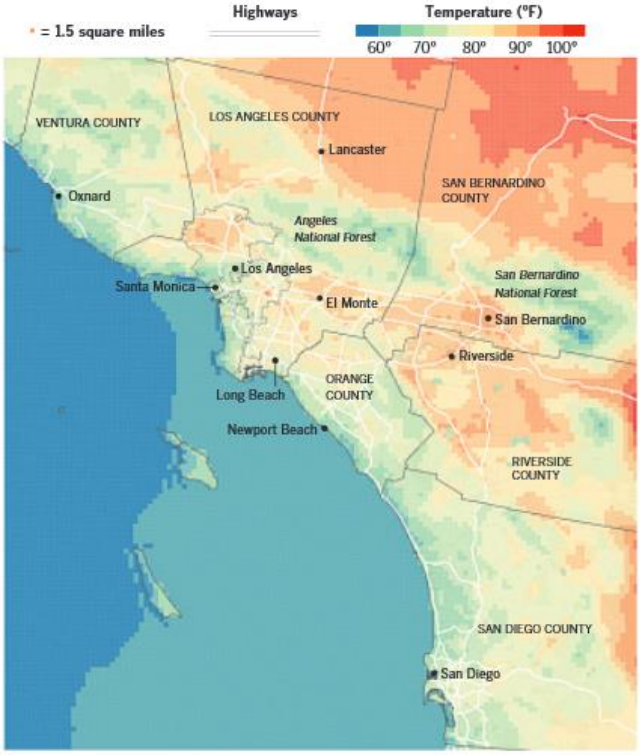
Petersen said work like this will help identify which areas should be targeted for cooling and which strategies will work best. By 2019, he hopes to have a better idea of how realistic the goal of lowering the temperature by 3 degrees really is, as well as the best way to achieve it.

The cooling of Los Angeles is still years away, but the groundwork has begun.

GEORGE BAN-WEISS, right, and Arash Mohegh remove a mobile thermometer from a car. (Gary Coronado Los Angeles Times)

Varying degrees

George Ban-Weiss and his team at USC's Department of Civil and Environmental Engineering performed model simulations that quantify how temperatures can vary across Southern California on a typical July day. The sea breeze drives temperature increases farther from the ocean, but localized heat and cool islands occur due to differences in land cover.

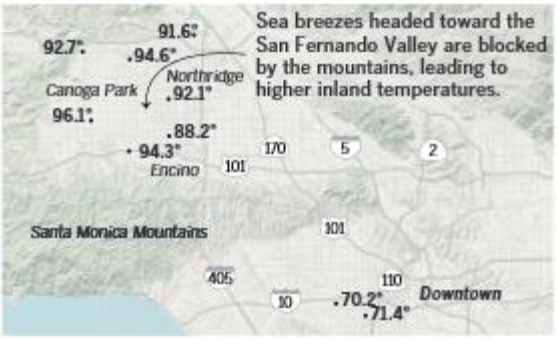


Sources: Mapbox, OpenStreetMap. Model data provided by George Ban-Weiss and Pouya Vahmani from USC.

P. Krishnakumar Los Angeles Times

Heat islands

Arash Mohegh and Mo Chen, two members of Ban-Weiss' team, drove across the San Fernando Valley and measured temperatures over the course of the day on June 2, 2016. They found a variability of more than 20 degrees between downtown L.A. and areas of the Valley such as Northridge and Canoga Park.



Sources: Mapbox, OpenStreetMap, USC Department of Civil and Environmental Engineering, Lawrence Berkeley National Laboratory

P. Krishnakumar Los Angeles Times

At Standing Rock, even toilets make a statement

Efficient facilities combine composting and community

By William Yardley
LA Times 2/12/2017

ALONG THE CANNONBALL RIVER, N.D. — The scale and duration of the protests that have unfolded here since last spring by those determined to block the Dakota Access oil pipeline have created endless logistical challenges.

The camps are far from any city, lack electricity and running water and offer no permanent shelters. If people need something, they have to bring it or build it. That includes bathrooms.

For months, the prairie grass provided the only accommodations. Then, in a sign that protesters planned to stay a while, portable toilets were hauled in.

Late last fall, though, a new problem arose: The weather started getting cold. Soon it would get really cold, North Dakota cold, as in well below zero. At those temperatures, the contents and occupants of portable toilets can freeze.

And so it was that one of the nation's largest and longest environmental protests found a solution to an environmental problem that had nothing to do with fossil fuels. They needed to go to the bathroom, so they created an elaborate composting toilet operation that has become a marvel of efficiency and an unlikely center of community.

"Everyone's happy and relaxed in here," said a woman from Burbank who goes by the name Dancing Fox and is one of scores of volunteers who help maintain the toilets. "You've got hand sanitizers, baby wipes, news bulletins, joking, singing, party lights."

She was not kidding. People milled about, chatting, checking fliers posted on a wall. The place is warm and lively — and not particularly malodorous.

"It's minty," Dancing Fox said, perhaps embellishing.

The idea for the toilets came about in November, when a protester suggested to Chief David Archambault of the Standing Rock Sioux Tribe that he invite global nonprofit GiveLove.org to help create a composting bathroom system that could handle the hundreds of protesters flocking in to help fight the pipeline.

GiveLove, formed by actress Patricia Arquette in response to the 2010 Haitian earthquake, has created composting toilet systems there and in Colombia, Uganda, Kenya, India and elsewhere. But the upper Great Plains presented a new frontier.

“It was a huge challenge to get it up and running in a blizzard,” said Alisa Keesey, the organization’s program director.

GiveLove staffers spent weeks at the camp, building the wooden boxes that serve as toilets and working with others to design and build the spaces and organize volunteers to manage the facilities. Arquette spent considerable time there, helping build more than 100 of the commodes, Keesey said.

By early December, with temperatures plummeting and snow piling up, three toilet operations were opened in large old Army tents. Each includes 13 toilet stalls surrounding a common area with a wood-burning stove that ventilates through ducting in the fabric roof. Wood framing around the sides of the tent is lined with hay for insulation.

Odor control consists of pine shavings every user is instructed to spread over their business. People also burn sage, and the aroma of the wood stove helps as well.

One of the volunteers on a recent day was a nurse from Montana who goes by the name Peaches. She said the camp, which swelled into the thousands at times but recently had dwindled to a few hundred people, has had no notable outbreak of intestinal viruses despite the lack of plumbing and the close quarters, particularly during the winter.

“We seem to be making up for it with magic,” Peaches said. “These sorts of situations without running water, without sewage, do tend to lead to spreads of disease. We’ve had some upper respiratory flu, but it’s usually G.I. stuff that you get in these sorts of situations, and that’s not happening.”

The composting begins at the toilet. Each wooden toilet box is lined with a green compostable bag surrounded by a white plastic bag. When the boxes become half-full, which can happen several times a day, a volunteer uses the plastic bag to remove the compostable bag. The compostable bags are then moved to a shipping container at the Standing Rock Sioux Reservation.

The actual composting will not begin until the thaw. Volunteers will build large compost bins and cover the toilets’ contents with rotted hay or straw.

Not all of the camps at Standing Rock use the toilets. The original camp, Sacred Stone, on a bluff above where the larger camp later formed, uses pit latrines. Some protesters, particularly elderly ones, have been given composting toilets to use at their individual campsites.

There is pressure now for people in the larger camp, Oceti Sakowin, to move. The tribe is urging people to clear out before anticipated spring floods and to help improve

relations with local government and law enforcement — especially since the Trump administration has approved the last permit for the pipeline, and the fight is moving to the courtroom.

Keesey said the toilets can be moved, perhaps to protest camps elsewhere. Some Native American tribes have expressed interest in using composting toilets on rural reservations that lack plumbing.

Who knows the possibilities? Keesey said. “This is kind of the next new thing.”

Oxnard keeps wastewater fund rating

Facing fear of downgrade, city continues with suit, seeks to increase rates

WENDY LEUNG
Ventura County Star 2/11/2017

When it comes to the state of Oxnard's wastewater fund, no bad news is, in a sense, good news. So when Standard & Poor's released a report Wednesday affirming the fund's "BBB" rating, it was reason for city leaders to breathe a sigh of relief, although most other municipalities likely would wince at such a grade.

Shortly after the November election, when voters approved Measure M, the wastewater rate hike repeal, Standard & Poor's put the wastewater fund on negative CreditWatch. This meant there was good chance the wastewater rating could be downgraded from "BBB" to "BBB-."

The latest report removed the negative CreditWatch, meaning the "BBB" rating can stay for now.

"This definitely confirms what we've all been saying, that we're in the worst situation you can get. S& P just confirmed it," said Jim Throop, chief finance officer for the city. "You can go a little worse, but then you're underwater completely."

A ratings downgrade would trigger termination of the wastewater fund's variable-rate bonds, meaning that in the worst-case scenario, the city would have to pay back millions in debt and fees. Standard & Poor's decided to keep the credit rating as it is for a number reasons, according to the report.

The city is continuing to pursue litigation against Aaron Starr, author of Measure M. A judge has ordered a temporary stay on Measure M, meaning the rate increases won't be repealed until the lawsuit reaches a conclusion. Finally, the city received an extension of a letter of credit from Union Bank, which acts as a sort of co-signor to the city's wastewater bonds.

"It affirms the actions that the council has been taking," Assistant City Manager Jesus Nava said about the report. "Hopefully, the judge will rule in our favor, and we'll get that money."

A lot of things are still up in the air. That may be why the report stated that the outlook of the wastewater fund is still negative. If the judge does not rule in the city's favor in the Starr lawsuit and if the letter of credit expires, the wastewater rating may be downgraded.

"We continue to view the wastewater system's credit quality as weak relative to those of its peers based on the city's audited financial statements for fiscal year 2016," according to the report.

Last year, the city's wastewater fund had $6 million in reserves, which is enough to operate the system for 101 days.

STAR FILE PHOTO

The report states that the wastewater fund balance is low and continues not to meet its bond obligations.

Last year, the fund had $6 million in unrestricted reserves, which is just enough to operate the wastewater system for 101 days. While the city awaits the lawsuit to begin in June, it's in the process of raising wastewater rates again. Those new rates are expected to take effect in July. According to the report, if new rates aren't implemented in a timely manner, that is another reason for a ratings down- grade. The new rates are crucial for the wastewater fund, particularly if the city loses its lawsuit. If that's the case, the city would have to refund residents the rates collected after the Measure M stay. That would cost the city $4.5 million more.

Throop said if that were to happen, rates would have to increase beyond what will be proposed for July. "If we don't prevail' in the lawsuit, Throop said, 'the rates that will be proposed will have to be redone again to bring us up to an even higher amount."

Public safety briefs

Storm slows down, keeps county saturated

The storm system that drenched the upper two-thirds of California this week and passed through Ventura County rapidly weakened and slowed as it moved down the coast Friday.

Ventura County got a mild soaking as the storm passed through. Although much of the rain fell during commuting hours, no major crashes or roadway hazards were reported.

Most cities in Ventura County reported around a quarter-inch of precipitation, according to the Ventura County Watershed Protection District. The coastal cities of Port Hueneme, Oxnard and Ventura received 0.21 inch, 0.22 inch and 0.23 inch, respectively the district reported. Camarillo and Santa Paula also received about that amount, while Moorpark, Simi Valley and Fillmore received slightly more, the district reported. Both Thousand Oaks and Ojai reported 0.36 inch of rain, according to the district.

The storm was weaker than some had predicted. After the front was cut off from most of the energy of its parent low-pressure system near Seattle, rainfall predictions were reduced.

Even after the rainfall tapered off in Northern California, problems persisted in that region. In Butte County, workers scrambled to rescue millions of baby salmon from a hatchery being buried in mud from the crumbling spillway of the Lake Oroville Dam. And a swath of the state's northern interior was under flood warnings until midmorning Saturday.

In the Central Valley, the agency's Hanford office issued a flood advisory through 2 p.m. Saturday for south central Madera County and central Fresno County. Minor flooding was expected along the San Joaquin River for several days because of abnormally high water releases from Friant Dam.

Forty-six of 48 gates of the Sacramento River weir were open to accommodate increased flows and reduce the risk of urban flooding in the state capital

Ventura County Star 2/11/2017

California briefs

Emergency spillway use likely at Oroville Dam in California

OROVILLE, Calif. California may avoid emergency releases from a rain-choked reservoir by further sacrificing a rapidly deteriorating concrete spillway while still protecting Oroville Dam, state officials said Friday.

The California Department of Water Resources significantly increased releases from Lake Oroville even though unexpected erosion chewed through the spillway earlier this week, sending chunks of concrete flying and creating a 200-footlong, 30-foot-deep hole that continues growing.

State engineers expect that water flowing out of the dam will catch up with the torrent flowing in from recent storms by sometime Saturday if they can continue the higher flows. “Basically it’s going to be a triage situation. We know we’re going to have erosion going on but it’s in the best interest of the lake right now to be able to keep using the spillway to evacuate water,” said department spokesman Eric See.

That could save them from having to use an emergency spillway for the first time in the reservoir’s 48-year history.

They were still preparing for the possibility by clearing trees and brush from the emergency spillway down a steep ravine to minimize the debris that would flow into the Feather River. They were reinforcing part of the overflow area with rocks stabilized with concrete and using helicopters to relocate power lines out of harm’s way.

Rescue efforts also continued for millions of hatchery-raised fish imperiled by muddy water flowing downstream alongside the damaged spillway after sections of its concrete walls collapsed earlier this week.

Officials cheered improving weather that made it less likely they would have to use the emergency spillway. “Glad to look out the window and see some sunshine,” See said at an afternoon briefing.

Torrential rainwater flowed into the lake overnight Thursday nearly three times as quickly as it could be released, bringing the lake to within six feet of overflowing into the emergency spillway.

Water was still entering the lake twice as fast as it could be released Friday afternoon. But the deluge was expected to continue easing into Saturday, low enough that officials can begin reducing the lake level to prepare for future winter storms.

Associated Press writers Kristin J. Bender and Ellen Knickmeyer contributed to this story from San Francisco.

Ventura County Star 2/11/2017

One torrential spill test

As concrete ramp erodes, officials hope to avoid using unpaved backup

WATER surges down the damaged spillway at Oroville Dam. Inflow to the lake had peaked, raising hopes of avoiding emergency measures. (David Butow For The Times)

By Chris Megerian, Bettina Boxall and Joseph Serna
LA Times 2/11/2017

Friday afternoon the sun peeked through the clouds above Lake Oroville and a rainbow arched over the Feather River.

It was a welcome sight for state engineers who were battling the lake's worrisome rise with torrential releases down the reservoir's broken concrete spillway.

The break in storms and a drop in the volume of water pouring into the huge reservoir gave dam operators hope that they could keep lake levels from hitting an elevation of 901 feet — the point at which uncontrolled flows would start washing down an unpaved emergency spillway that has never been used in Oroville's 48-year history.

"The sun is coming out. The rain has stopped. The inflow has peaked," said Eric See, a spokesman for the state Department of Water Resources. "We still don't expect to use the auxiliary spillway."

For much of Friday, managers were pushing water down the damaged spillway at the rate of 65,000 cubic feet per second, or more than 29 million gallons a minute. In the evening, they reduced it to 55,000 cfs.

The flows exploded into the air as they hit the deep gash that opened in the spillway this week. From there, the water carved into the sloping earth beside and beneath the chute, turning the ground the color of heavily creamed coffee and washing mud, rock and pieces of concrete into the Feather River below.

“It’s pretty impressive. I’ve never seen anything like it,” said Elberta Portman, 63, as she watched the clouds of mist rising from the spillway.

She had driven up from the Sacramento area with her husband, Dennis, 66. They hadn’t been to the lake for about 15 years, when they stayed on a houseboat.

Though optimistic that dam operators won’t have to use the emergency spillway over the weekend, crews continued to prepare the area — just in case.

Workers with the California Department of Forestry and Fire Protection used heavy equipment to clear trees and brush from the hillside route the water would take if it overflowed the 1,700-foot-long top of the emergency spillway.

Utility workers were preparing to move transmission towers out of the way. Booms and boats were brought in to collect debris and keep it from clogging the pool at the base of the dam and downstream diversion gates.

A gaping hole — some 250 feet long and 45 feet deep — appeared Tuesday in the lower part of the spillway, which sits on dirt. The state shut down releases for a time but then restarted them to counter inflows from the week’s storms.

“It’s a balancing act,” said water resources spokesman Doug Carlson.

Even if the emergency releases are triggered, department officials said it would not flood the Feather River.

A team of hydrologists, meteorologists and engineers concluded that the “river channel can accommodate whatever we throw at it today and over the weekend,” Carlson added.

State engineers repeated that Oroville’s earthen dam — a separate structure from the spillway — was not in any danger.

“There’s no erosion going on at Oroville Dam,” See said. “Oroville’s dam is completely intact. It is not in jeopardy in any way.”

State engineers don't know what caused the collapse of the spillway section, which has further eroded from the pounding dam releases.

The structure is annually inspected by several agencies and was last repaired in 2013.

" We made repairs and everything checked out," said water resources engineer Kevin Dossey. "Obviously, something has happened that we didn't expect."

He added that it was common for spillways to require repairs after drainage creates voids in the underlying soil.

In an interview, Dusty Myers, president of the Assn. of State Dam Safety Officials, agreed.

"It's not uncommon to have an issue like this," he said of the spillway hole — though he added he was not aware of any as large as the one that developed at Oroville.

It is also not unusual, Myers said, to have an unpaved emergency spillway that would erode if used.

At 770 feet high, Oroville is the tallest dam in the United States. It was completed during the administration of Gov. Ronald Reagan and serves as the keystone for the State Water Project, which sends Northern California supplies south to the southern San Joaquin Valley and the urban Southland.

In January 1997, downstream towns were evacuated when the reservoir came within a foot of pouring down the emergency spillway into the swollen Feather River.

"People were told to pack up their stuff and get out," recalled Mike Ramsey, the longtime Butte County district attorney.

Oroville didn't flood then, but this week, Ramsey said, residents have been wondering: "Are we going to have to evacuate again? Are we going to have to start pulling stuff out?"

Still, with no evacuation order and the lake inflow dropping, locals were calm enough to go about their usual business Friday.

In a sign of confidence that things will be OK, Ramsey said the local rotary club hadn't canceled a planned Saturday night dinner in the municipal auditorium, which sits on the river levee.

Megerian reported from Oroville, Serna and Boxall from Los Angeles.

Oroville Dam spillway

An unpaved emergency spillway — a hillside lined with trees and soil — may be needed to keep Lake Oroville from reaching critical levels that would threaten the dam. The main concrete spillway is damaged.

Sources: California Department of Water Resources, Google Earth

Los Angeles Times

Brian van der Brug Los Angeles Times

A RAINBOW arcs over the swollen Feather River. Even if emergency releases are triggered, state officials said, the amount of water would not cause the river to flood.