



FLOOD CONTROL

Is too much water stored behind Oroville Dam?



JOSÉ LUIS VILLEGAS Sacramento Bee file

Two men stroll on top of Oroville Dam in 2009. Some water experts want to give the dam's operators more discretion to cut the amount of water they're required to store.

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Long before a fractured spillway plunged Oroville Dam into the gravest crisis in its 48-year history, officials at a handful of downstream government agencies devised a plan they believed would make the dam safer: Store less water there.

Sutter County, Yuba City and a regional levee-maintenance agency brought their recommendation to the Federal Energy Regulatory Commission in 2006, when FERC was considering the state's application to relicense Oroville Dam.

Their plan, unveiled nearly a decade after heavy rains breached downstream levees and caused severe flooding along the Feather River, called for reducing water storage at Lake Oroville by 150,000 acre-feet during winter. That would have reduced maximum water levels in the reservoir, as

set by the U.S. Army Corps of Engineers, by about 11 feet.

The proposal went nowhere. State dam operators and a powerful consortium of water agencies serving Silicon Valley, Southern California and portions of the San Joaquin Valley opposed the idea, which would have sent water cascading down the Feather and reduced the amount stored in the reservoir for their use. The water agencies and the state instead argued that the reservoir's flood-control operations, governed by a 1970 Army Corps manual, were sufficient.

Yet those operating rules depend in part on a controversial assumption: that empty space above the dam's main spillway could provide a buffer against powerful rainstorms, yielding additional flood control capacity.

That concept proved faulty last month, after a massive crater formed in the dam's main spillway during a big storm. The spillway was shut down



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A torrent pours down Oroville Dam's spillway. It was unable to drain Lake Oroville fast enough during February's storms, resulting in water pouring over the adjacent emergency spillway for the first time ever.

temporarily to check the damage, and then restarted in a concerted effort to keep water from rising above the spillway. Water rose too quickly, however, and eventually poured over the adjacent emergency spillway for the first time in dam history. When officials realized the emergency structure was in danger of crumbling, they evacuated 188,000 downstream residents for two days.

Stuart Somach, a veteran Sacramento water lawyer who represented the Sutter County coalition that tried to change Oroville's rules in 2006, said the crisis illuminates persistent shortcomings in the reservoir's governing plan. The buffer space above the main spillway proved undependable because the emergency spillway itself was unsound.

"You can't rely upon that," he said. "You've really added nothing in the way of effective flood control." The true solution is keeping the lake lower, he said.

Dam operators and other experts say it's far from certain that keeping the lake lower would have helped Oroville avoid its crisis last month. Joe Forbis, chief of water management at the Army Corps' regional office in Sacramento, said lower water levels probably would have delayed the emergency, but wouldn't necessarily have prevented it.

"If there was more space in the reservoir, then it would have taken longer to fill," Forbis said. "But whether or not that would have made a difference last month, I don't know the answer to that."

Bill Croyle, acting director of the state Department of Water Resources, which runs Oroville Dam, said a crucial factor was the heavy rain and snow that have fallen on the Feather River watershed all winter, punctuated by a huge storm that poured into the region just as the main

spillway cracked Feb. 7.

"The issue is not how much flood space" was in the reservoir before the main spillway fractured, Croyle said.

Sacramento flood safety expert Joe Countryman agreed the rainstorm became the overriding issue. Besides, having the lake at a reduced level wouldn't have helped because the main spillway can only make significant releases when water levels are relatively high, said Countryman, a retired Corps engineer and member of the state's Central Valley Flood Protection Board.

Even if the lake had been lower, "the space would have been filled up," Countryman said.

Somach said he wouldn't dispute Countryman's analysis, adding, "It might not have mattered." But he said keeping the lake lower would have given dam operators more time and flexibility to deal with the problem after the main spillway cracked.

"You would have had a head start," he said.

Somach is among a growing chorus of state officials and water policy experts calling for a fresh look at reservoir operations following last month's near-catastrophe. They're urging the Army Corps to rewrite the manuals that establish how much water can be stored during the rainy season at Lake Oroville and 53 other California reservoirs governed by Corps regulations. In the alternative, they want reservoir operators to use their discretion to store less water than the maximum permitted by the Corps.

"Every time we get a big snowpack up there, and there's a potential warm storm, I can say for everybody down here, the anxiety builds," said Assemblyman James Gallagher, R-Yuba City. "We need to change operations when we have this large snowpack and the potential warm storms and we need to ensure the lake levels are lower."

The dispute in many ways underscores the core tension underlying the governance of California's big reservoirs. The facilities serve two purposes that often collide: flood control and water storage. Water released from Oroville in a wet winter, when rivers are running high, likely will wind up in the Pacific Ocean. That leaves less water available later in the year for cities and farms that depend on Oroville for storage.

Oroville, California's second-largest reservoir, is the linchpin of the State Water Project, which is run by DWR and supplies Silicon Valley, portions of the San Joaquin Valley and most of Southern California. Somach said water users' opposition torpedoed Sutter County's decade-old proposal to reduce lake levels in winter.

"It was really the politics of the state water contractors and DWR not wanting to give up water supply," Somach said.

DWR officials say they would never compromise safety at Oroville to boost supplies for State Water Project contractors.

"During flood control season, flood control is the top priority of the Department of Water Resources in operating Lake Oroville," said spokeswoman Nancy Vogel of the Natural Resources Agency, which oversees DWR.

Rainy season operations at Oroville and other big reservoirs in California are subject to flood control rules laid out in a series of Army Corps manuals. The amount of mandatory empty space fluctuates with the calendar, and varies from reservoir to reservoir, depending on a hydrological analysis.

But much of those analyses are reliant on data that critics say is decades out of date, and fails to account for the heavier, warmer storms expected with climate change. Most dam manuals haven't been updated since the 1980s or earlier.

The Oroville manual was published in 1970, two years after the reservoir opened. It says Lake Oroville should be kept at least one-fifth empty during the peak rainy season, from early January to late March. That translates into a lake level of 848.5 feet and a maximum of 2.79 million acre-feet of water, leaving about 750,000 acre-feet of empty space. Lake Oroville was at about 853 feet high, slightly above the maximum, and was releasing water out of the main spillway when the concrete chute fractured last month.

There's a wrinkle in the Army Corps rules: It assumes the existence of a companion dam in Marysville that would provide additional flood protection downstream. That second dam, proposed in the 1960s, never happened. Without it, operators at Oroville are instructed to keep an additional 150,000 acre-feet of flood space in reserve, for a total of 900,000 acre-feet.

But instead of actually having to keep the lake lower, dam operators can count the area above the main spillway gates as "surcharge" space, providing total flood-control capacity of 900,000 acre-feet.

Somach and the Sutter County coalition argue the "surcharge" space is illusory.

"You ought to be holding the reservoir 150,000 acre-feet lower," said Somach. That would bring lake levels down about 11 feet.

Dam operators have shown a reluctance to use the "surcharge" space. In the heavy winter storms

of 1997, when water threatened to overtop the emergency spillway, dam managers responded by blasting water from the main spillway at an extraordinary 160,000 cubic feet per second, or 10,000 cfs more than Feather River levees downstream were rated to absorb. Local officials blamed the surge of water for a downstream levee breach that flooded hundreds of homes and left three people dead. State officials deny the releases were at fault.

Last month, DWR officials worked furiously – but ultimately without success – to keep water from reaching the untested emergency spillway, concerned about how erosion of the hillside below would impact the Feather River downstream. As it turned out, the erosion was so severe it threatened the emergency structure itself. Crews have spent the past month shoring up the hillside, and DWR officials have said they don't want to use the emergency structure again but believe it would stand up if necessary.

The Corps is studying what happened at Oroville last month and could alter its rules governing the reservoir's operations, said Forbis with the Army Corps' regional office. But he said it's too early to say, and that rule changes require costly and time-consuming engineering and environmental studies.

This is hardly the first time tensions have arisen over the Army Corps' flood control rules. Last winter, with much of the state still gripped by drought, water agencies in greater Sacramento seethed when the U.S. Bureau of Reclamation released gobs of water from Folsom Lake when the forecast was clear and the reservoir was already 40 percent empty.

The Corps is releasing a new set of rules for Folsom Lake this year, but only because of major capital improvements designed to improve dam operators' flexibility. The bureau is putting the finishing touches on a \$900 million auxiliary spillway that will enable the reservoir to release water more quickly if a big storm is coming.

State officials want the rules to change as well for Oroville and other reservoirs. California Natural Resources Secretary John Laird, testifying before a U.S. Senate committee March 1, said Army Corps rules need to be overhauled "to reflect current scientific knowledge" about precipitation patterns.

Rep. Jared Huffman, D-San Rafael, has introduced legislation in years past that would require the Corps to modernize its approach to reservoir flood safety, but the legislation has stalled.

"Hopefully, Oroville's a wake-up call," he said.

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