



Montecello-Berryessa Dam



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I've blogged here many times about dam breaks, both real and hypothetical. Three of the best known ones in America were the Johnstown Flood of 1889, the Saint Francis Dam failure of 1928 and the Teton Dam collapse of 1976. Those disasters released 16 million, 45 million and 330 million cubic meters of water respectively.

With the recent quake in Napa, some attention has been drawn to Napa County's Montecello-Berryessa dam. Monticello dam is a concrete arch constructed in the mid 1950s. At capacity its reservoir, Berryessa Lake, holds some 2,000 million cubic meters of water, vastly more than those infamous ones mentioned above.

Berryessa Dam is inspected regularly by the Bureau of Reclamation following any seismic activity. Certainly it suffered no damage from the recent quake, but larger active faults do lie close to and even under the structure, so it is prudent to be aware of the potential for earthquake-related damage.

To focus thought, I have created this computer simulation [<http://es.ucsc.edu/~ward/berryessa-dam.mov> (<http://es.ucsc.edu/~ward/berryessa-dam.mov>)] of the first sixteen hours of flooding that might be expected from the failure of the Dam. This worst-case scenario envisions a nearly instantaneous breakdown of the structure and a reservoir filled to capacity. Likely the former condition would not apply to an actual breach and considering California's drought, the latter condition is a pipe dream.

The situation at Berryessa Dam is distinct from those other three cases. For one, the dam is sited in a narrow canyon with the bulk of the water stored in an expansive lake well upstream. Rather than flush-and-gone, a dam break here is akin to opening a valve to a hose that will spray at nearly constant rate for hours and hours. Second, just down stream is California's Central Valley, a very flat and nearly unchanneled place. Don't expect the flood to follow a well-defined river track as you might elsewhere.

The simulation suggests that about 1,000 square kilometers will be affected. Most areas would see water less than one or two meters deep, but the outburst would last a day or more. The arrows colored blue, green, yellow, orange and red are flow velocities of 1, 2, 3, 4, >5 m/s respectively.

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