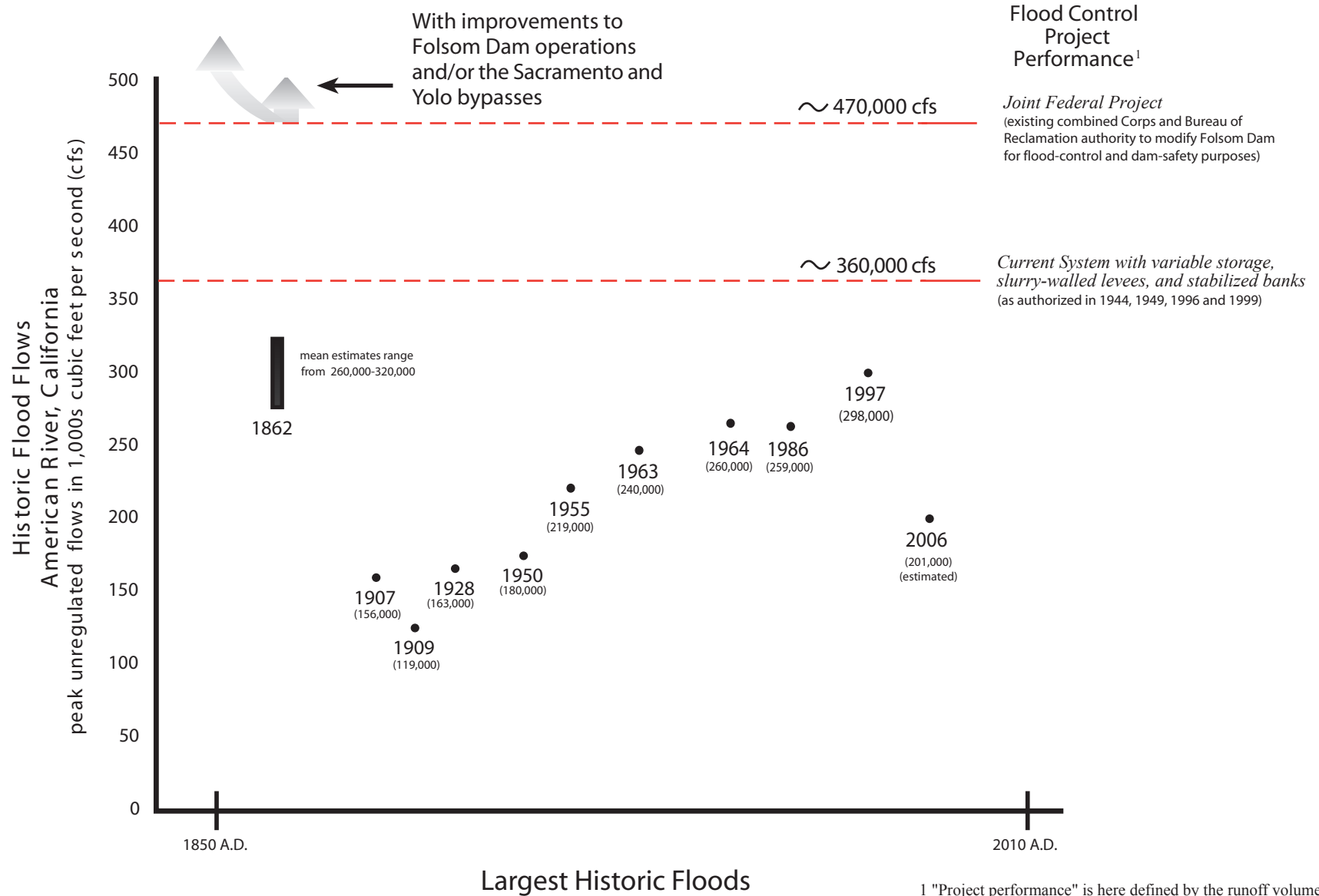


# Record American River Floods, Existing and Authorized Flood Control Project Performance



<sup>1</sup> "Project performance" is here defined by the runoff volume (as measured by the flood peak of the unregulated "design flood" hydrograph) that a particular flood-control system can reliably accommodate. In dam-controlled watersheds, use of unregulated (total flow into rivers and storage) runoff-volume hydrographs allows planners to easily compare the performance of past, existing, and planned flood-control projects against historic, modern, and hypothetical storm-runoff events.

# CONTROLLING AMERICAN RIVER FLOODS

## *Understanding the past, meeting the challenges of the future*

One hundred and fifty years of historic flood experience along the American River underscores the fact that by continuing to upgrade the existing Folsom Dam and downstream river levees, Sacramento area residents can build a flood-control system capable of managing American River flows substantially larger than any floods that have occurred on the river since the founding of the City.

Since their construction in the 1950s, flood-control works along the American River have been able to contain record high flows within the development-narrowed floodway. However, these flows have approached the capacity of the old flood-control system<sup>2</sup> — with flows generated by storm types that meteorologists have identified as the producer of extreme rain-flood events in large watersheds on the western slope of California's Sierra Nevada mountains.<sup>3</sup>

In response, Sacramento, the State, and the Federal government have embarked on a program to improve the American River flood-control system, and over the past two decades, considerable work has been undertaken to improve the reliability of Sacramento's levees.

That work includes a major improvement (slurry walls) to the American River levees authorized by the Congress in 1996, a project that is now moving toward completion. Additional floodwater management space was dedicated (during wetter winters) at Folsom Dam beginning in 1994 and 1996. And in 1999, Congress authorized two additional changes: 1) higher capacity outlets for the 50-year-old Folsom Dam upstream from the City of Sacramento, 2) levee raises to reliably contain planned emergency releases from Folsom Dam.

After the Corps experienced design and contacting problems with the Folsom Dam modifications in 2005, a combined Bureau of Reclamation and Corps of Engineers project integrating the Corps' flood-control projects and the Bureau's seismic-safety and spillway-adequacy programs is in the design stage with major construction expected to start by the beginning of 2008. This project will feature the construction of a large auxiliary spillway to the south of the main dam. (The levee-raise projects could be ready to begin in 2007.)<sup>4</sup>

Additional performance enhancements are also possible. In 1992, 1999, and 2004, Congress directed that federal flood operations from Folsom Dam be optimized — including a renewed<sup>5</sup> emphasis on beginning flood-control operations when enormous flood flows are forecast. Such operations should materially improve the performance of the new auxiliary spillway.

Additional reviews are also being undertaken that someday may result in increasing the flow capacity of the Yolo & Sacramento bypasses — as well as setting back Natomas basin Sacramento River levees away from erosive river flows.<sup>6</sup> Such improvements could lower high river levels on the Sacramento and Lower American Rivers — as well as providing even more capacity, flexibility, and reliability for area and Sacramento Valley flood-control operations.

Standing astride the confluence of two major and dynamic rivers, confronting floodwater and floodplain management responsibilities will always be important to Sacramento. By assembling the history of flood information and looking to the future, Sacramento can make informed judgements and thoughtful decisions that will stand the test of time.

### **endnotes**

1. Performance estimates derived from MBK Engineers (engineering consultants for the Sacramento Flood Control Agency) and U.S. Army Corps of Engineers. Unregulated flow estimates are from the Corps of Engineers, Bureau of Reclamation, & MBK Engineers. (*From graphic*)
2. In 1997, unregulated runoff in the American River watershed approached 90 percent of the flood-control system's peak capacity at that time. In 1986 and 1997, unregulated runoff in this watershed also approached 90 percent of the more directly system-performance related 3-day "design flood" volume capacity of the system at the time.
3. Hydrometeorology Report #37, Meteorology of Hydrologically Critical Storms in California, U.S. Weather Bureau. The low-latitude storm type, popularly known as the "Pineapple Express" and identified by Robert L. Weaver in this 1962 report, is responsible for the most significant of the very large runoff events experienced in the American River watershed.
4. In June 2000, Sacramento voters voted for assessments to fund the local share of the Folsom Dam modification and some levee improvement projects. That same year, California voters approved a bond measure to finance the state share of water project improvements, including flood-control facilities in Sacramento. Both the Folsom Dam outlet-modification and flood-control dam raise projects have also been authorized by the California legislature.
5. From 1956 to 1987, the Corps' operating rules for Folsom Dam featured forecast-based operations, including making flood-control releases from the conservation pool in advance of extreme storms or arrival of the subsequent floodwaters into Folsom Reservoir.
6. Levees around the deep and rapidly urbanizing Natomas Basin, which are primarily affected by Sacramento River flows, were recently determined by the Corps to not meet new underseepage and stability standards. The Sacramento Area Flood Control Agency has announced its intention of starting a major new reconstruction project of these levees.