



Oroville Dam Update and Dam Safety Efforts Background

Wednesday, January 10, 2018
9:30 a.m. State Capitol, Room 4202

Oroville Incident

On February 7, 2017, California Department of Water Resources (DWR) employees at Oroville Dam noticed unusual water flow patterns on the dam's main spillway. When they stopped the flow to inspect, they discovered missing concrete and foundation erosion.

The next day, operators ran short-duration water flows over the spillway to monitor erosion. Inspectors determined that the size of the damaged section had doubled within this short time and it became apparent that the spillway would have to shut down. DWR activated emergency interagency operations centers to monitor and respond to the incident.

On February 9, DWR in consultation with federal entities again began releasing water down the spillway in an attempt to avoid the need for the water to rise over the dam's emergency spillway, and to prevent flooding at the dam's power plant. By that evening, storm forecasts for what was already expected to be the largest storm of the year indicated a significantly wetter storm than earlier predicted. Outflows along the spillway were increased the next day.

Despite these efforts, Lake Oroville rose above 901 feet at about 8 a.m. on February 11, and water began flowing over the 1,700-foot long concrete emergency spillway. This was the first time in the dam's 49-year history that the emergency spillway was engaged.

By the middle of the afternoon on February 12, anticipated erosion near the emergency spillway began progressing quickly and experts determined that this could pose harm to the emergency spillway's structure.

In response to this possible hazard, the Butte County Sheriff's Office issued mandatory evacuations for the Oroville area. Additionally, flows were increased down the main spillway to reduce the time that the emergency spillway would be needed. By approximately 8 p.m. on February 12, water stopped flowing over the emergency spillway when the lake level dropped below 901 feet.

This incident occurred during runoff to the area from the largest storm in 20 years. From February 6 through the next several days, runoff totaled more than a million acre feet. One acre foot of water is about 326,000 gallons.

Initial Recovery and Costs

DWR contracted with Kiewit Infrastructure West (Kiewit) in April to repair and replace 2,270 feet of the main spillway by November 1, in order to be ready for the upcoming rain season. To meet this deadline, more than 600 Kiewit workers put in more than 720,000 hours.

The initial contract for \$275 million was based on early design plans, and the costs increased as additional excavation and other work was needed to reach stable bedrock and to ensure safety at the construction site. These factors resulted in an increase from \$275 million to more than \$500 million.

According to DWR, repairs to the spillway will be paid by State Water Project (SWP) contractors for any costs not recoverable from federal grants or other sources. DWR has been working with the Governor's Office of Emergency Services to secure funding under the Federal Emergency Management Agency's (FEMA) Disaster Assistance Program. FEMA can cover 75% of eligible emergency response and repair costs. As of the middle of December, FEMA had reimbursed DWR for \$76.6 million.

Spillway Evaluations

In response to the Oroville incident, the Governor ordered a statewide comprehensive review of dam-related structures like spillways.

DWR's Division of Safety of Dams (DSOD), which oversees all dams within the state's jurisdiction, began reviewing dam spillway information. DSOD determined that, based on factors such as age of the spillways, dam capacities, potential hazards downstream, design features, geological conditions, and maintenance records, spillways at 93 dams needed to undergo comprehensive assessments. DSOD directed dam owners to conduct reviews of such items - among others - as spillway concrete lining and drainage systems, and to evaluate potential geological hazards and susceptibility to erosion and instability near spillways.

Letters to dam owners specified that known damage to the spillways must be repaired prior to the next flood season.

About Jurisdictional Dams

More than 1,200 dams are under the jurisdiction of DSOD, which inspects dams to ensure they are performing properly and being maintained appropriately. DSOD works with dam owners to resolve potential issues, including those related to dam safety.

A review of DSOD's dam records, as of September 1, 2017, showed that of the 1,249 jurisdictional dams, DSOD assessed most as being in "satisfactory" conditions:

- About 92% of dams were rated satisfactory
- About 7% were rated fair
- Less than 1% were rated poor or unsatisfactory

To be considered poor, a dam safety deficiency is recognized for conditions that may realistically occur, like stress from seismic activity or major storm events. Seven dams were classified as poor and those with this classification require corrective actions.

To be considered unsatisfactory, a dam safety deficiency is identified as one that requires immediate or emergency remedial action. As of September, when the work at Oroville was underway, it was the only one in the state rated as unsatisfactory.

State Water Project Background and Financing

Oroville Dam, which is owned and operated by DWR, is part of the SWP. The SWP is the state-built water storage and delivery system that distributes water to two-thirds of California's population.

Lake Oroville is the SWP's largest storage facility with a capacity of approximately 3.5 million acre feet.

SWP facilities have been mostly financed by general obligation bonds and revenue bonds. Repayment of these funds as well as the operation, maintenance, power and replacement costs associated with water supply are paid by the 29 agencies and districts that have long-term contracts with DWR for SWP water delivery.

DWR releases and posts online an annual report titled "Management of the California State Water Project," which includes information about project costs and financing, water supply planning, power operations, and significant events that impact the SWP. The most recent report, released in June, 2017, includes information from the 2015 calendar year.

During that year, the SWP had about \$1 billion in revenues with nearly all of it from water contract payments. Its expenses were about \$1 billion, with approximately 64% directed toward project operation, maintenance, power, and replacement while 30% paid bond principal and interest, and 5% was deposited into reserves.



ASSEMBLY COMMITTEE ON
WATER, PARKS AND WILDLIFE

EDUARDO GARCIA
CHAIR

2017 Legislative and Budget Actions Related to Dam Safety Background

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Following the Oroville disaster and May 11, 2017, joint oversight hearing, the Legislature passed several budget and policy measures to increase dam safety and accelerate flood protection.

Below is a short description of these changes.

Dam Safety Funding

The 2017 budget included \$8.3 million (General Fund) for dam safety as follows:

- \$6.5 million as a General Fund loan to the Dam Safety Fund, to be repaid from revenue generated from dam safety fees, and 12 positions, to support the following program enhancements:
 - \$3 million for the Department of Water Resources (DWR) Division of Safety of Dams (DOSD), to conduct more extensive evaluations of appurtenance structures, such as spillways, gates, and outlets; and,
 - \$3.5 million for the DWR to review and approve required inundation maps and coordinate the review of emergency plans.
- \$1.9 million and four positions to the Office of Emergency Services to review and approve dam-related emergency response plans, and coordinate with local emergency management agencies on incorporation into all-hazard emergency plans.

Emergency Flood Response

The budget included \$111 million to accelerate Proposition 1 funds for flood control projects, with budget bill language specifying, among other things, that the funding must be spent in accordance with the framework established in the 2017 Central Valley Flood Protection Plan update and the Central Valley Flood Protection Plan Conservation Strategy, where applicable. The acceleration of funds for flood projects compliments the dam safety budget allocations and

policy changes to provide a more comprehensive response to dam and flood safety. The money was allocated as follows:

- \$55 million for Delta levee maintenance, flood risk reduction, and emergency response.
- \$7 million for Central Valley flood risk reduction projects including levee repairs and enhancements, creating and enhancing flood bypasses and floodplains.
- \$40 million for flood risk reduction projects in the Central Valley that also enhance ecosystems and water quality downstream. These projects are intended to reduce pressure on levee systems operated by the state while allowing for floodplain habitat for endangered salmon and steelhead.
- \$9 million for coastal watershed flood risk reduction.

Dam Safety Trailer Bill Language

In addition to funding, the Legislature passed, as part of the comprehensive Resources and Environmental Protection trailer bill (SB 92 [Committee on Budget], Chapter 26, Statutes of 2017), an update to the state's dam safety policy. This legislation requires dams (except for low-risk dams) to have an emergency action plan that is updated every ten years, updated inundation maps every ten years, or sooner if specific circumstances change, and provide the DWR with enforcement tools, including fines and operational restrictions for failure to comply.

SB 92 Requirements for Dam Safety—Department of Water Resources (DWR)

- **Existing Law.** Existing law requires the DWR to supervise the maintenance and operation of dams and reservoirs as necessary to safeguard life and property. This prohibits the construction or enlargement of any new dam or reservoir until the owner has obtained approval of plans and specifications from the DWR. Exemptions are allowed for certain farm, ranch and irrigation projects.
- **Classification of Dams.** SB 92 requires the DWR, not later than July 1, 2017, to classify the public safety risk of all state jurisdictional dams, as prescribed, and to revise the classification to reflect changes in downstream population, critical infrastructure, and land use.
- **New Requirements for Construction and Operation—Including Civil Penalty Authority.** SB 92 requires approval for dam construction and operation, and provides for penalties and fines for violations. The bill authorizes the DWR to impose reservoir restrictions and levy property liens on an owner of a dam who fails to comply with certain provisions relating to safety or any approvals; and authorizes a civil penalty of up to \$1,000 per day, in addition to any other penalty. SB 92 requires, if a dam is owned by

one or more persons or entities, that the owners form or delegate legal and financial authority to a single entity that is required to be responsible for the operation and maintenance, as well as the payment of any fees or other costs associated with dam ownership.

SB 92 Requirements for Dam Safety—Office of Emergency Services

- **Existing Law.** The California Emergency Services Act requires the Director of Emergency Services to coordinate the emergency services of all state agencies in connection with a state or local emergency. The act requires local governmental organizations, utilities, or other public or private owners of a dam to submit an inundation map that delineates potential flood zones that could result in the event of failure when the reservoir is at specified capacities and requires the Office of Emergency Services (OES) to review the maps to determine whether the maps meet prescribed requirements.
- **New Requirements for Emergency Preparedness.** SB 92 requires the owner of a dam that is regulated by the state be responsible for emergency preparedness with regard to the potential for loss of life and property resulting from the failure of a dam or its critical appurtenant structures. SB 92 requires the owner of a dam that is regulated by the state to prepare and submit an inundation map showing the area that would be subject to flooding under various failure scenarios unique to the dam and its appurtenant structures (dams classified as low hazard are exempted from this).
- SB 92 requires the owner of a dam to develop and submit to the DWR and the OES an emergency action plan with certain components, based upon the inundation map or maps approved by the department, and requires period updates to the plan, among other things.