

CEE Special Seminar

The Oroville Dam Incident: Insights and Implications for Risk Management and Community Resilience



Oroville Dam



Oroville Dam

- Largest earth dam in the U.S. by height – 770 feet
- California State Water Project
- Earthen embankment dam on the Feather River
 - Flood control,
 - Water storage,
 - Hydroelectric power generation, and
 - Water quality improvement
- Built 1961-1968
- Six power-generating turbines, 819 megawatts (MW)



Main Embankment

Main Spillway

Auxiliary Spillway

Oroville Incident



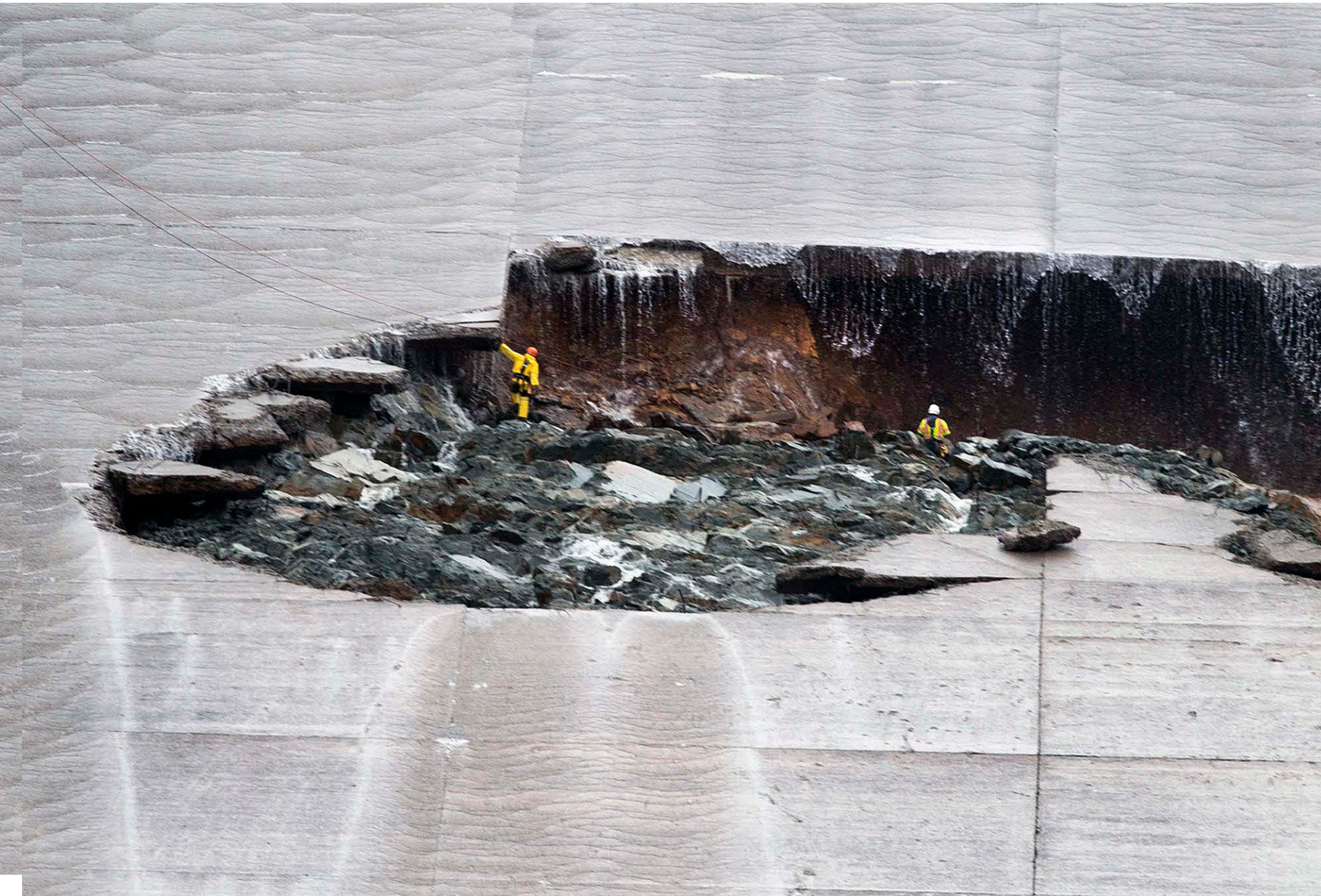




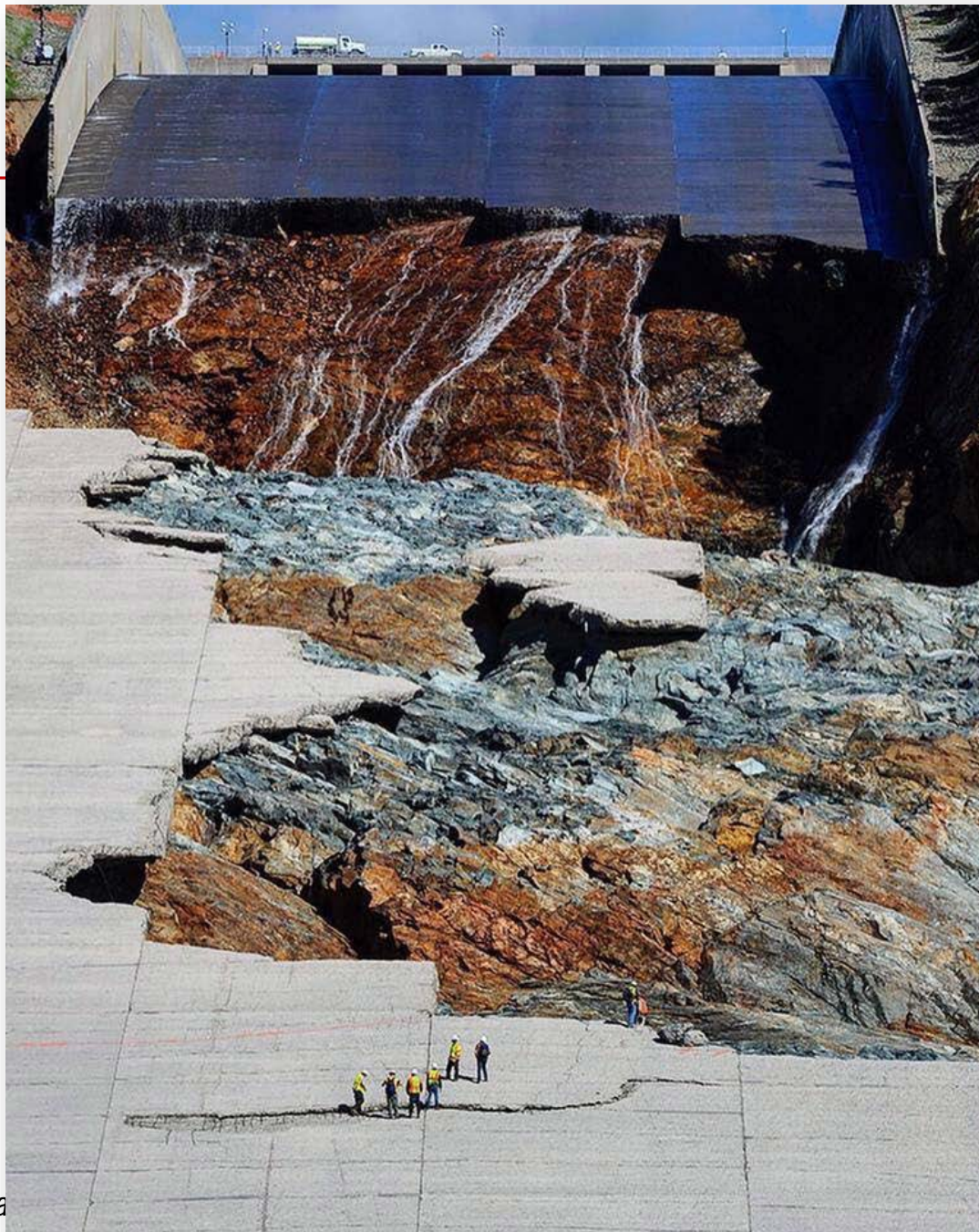












Imminent Failure of Auxiliary Spillway on Oroville Dam!

Dam itself is not compromised at present time



NWS Sacramento
Issued: 6pm 2/12/2017



NWS Sacramento ✓
@NWSSacramento

Follow

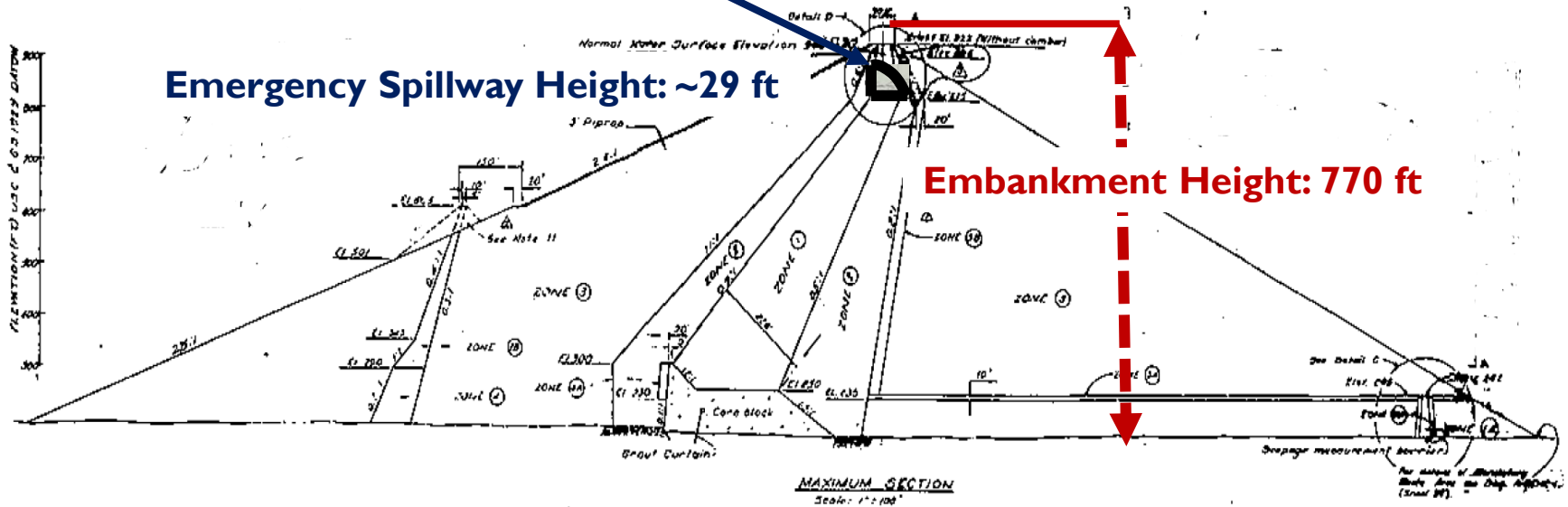
6:08pm: #OrovilleDam itself is not compromised at current time.
Failure would be on auxiliary spillway. See graphic for details.

6:08 PM - 12 Feb 2017

2,370 1,109

Dam Breach and Inundation

Emergency Spillway Crest Elevation: 901 ft*



*Not quite to scale



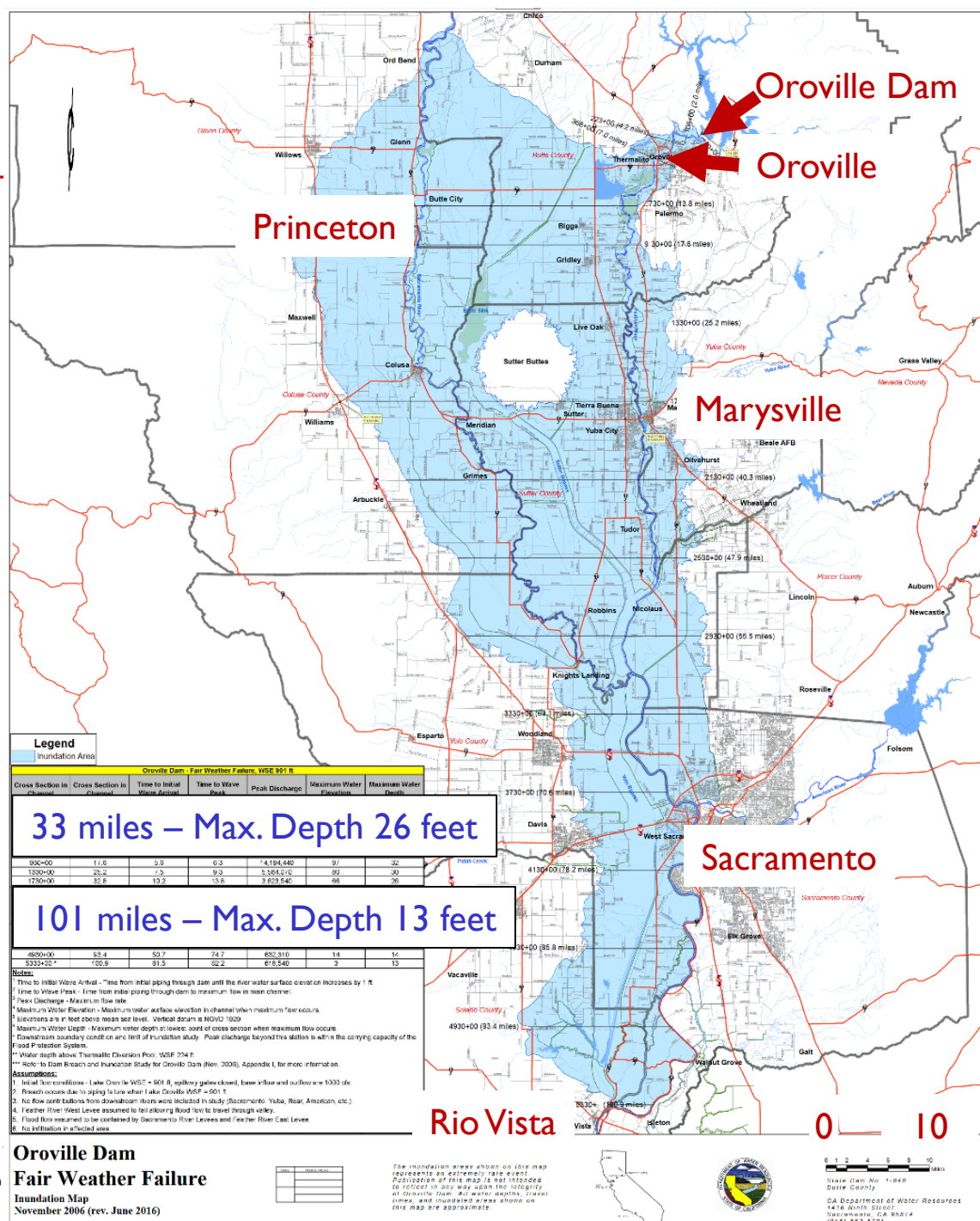
Main Embankment

Main Spillway

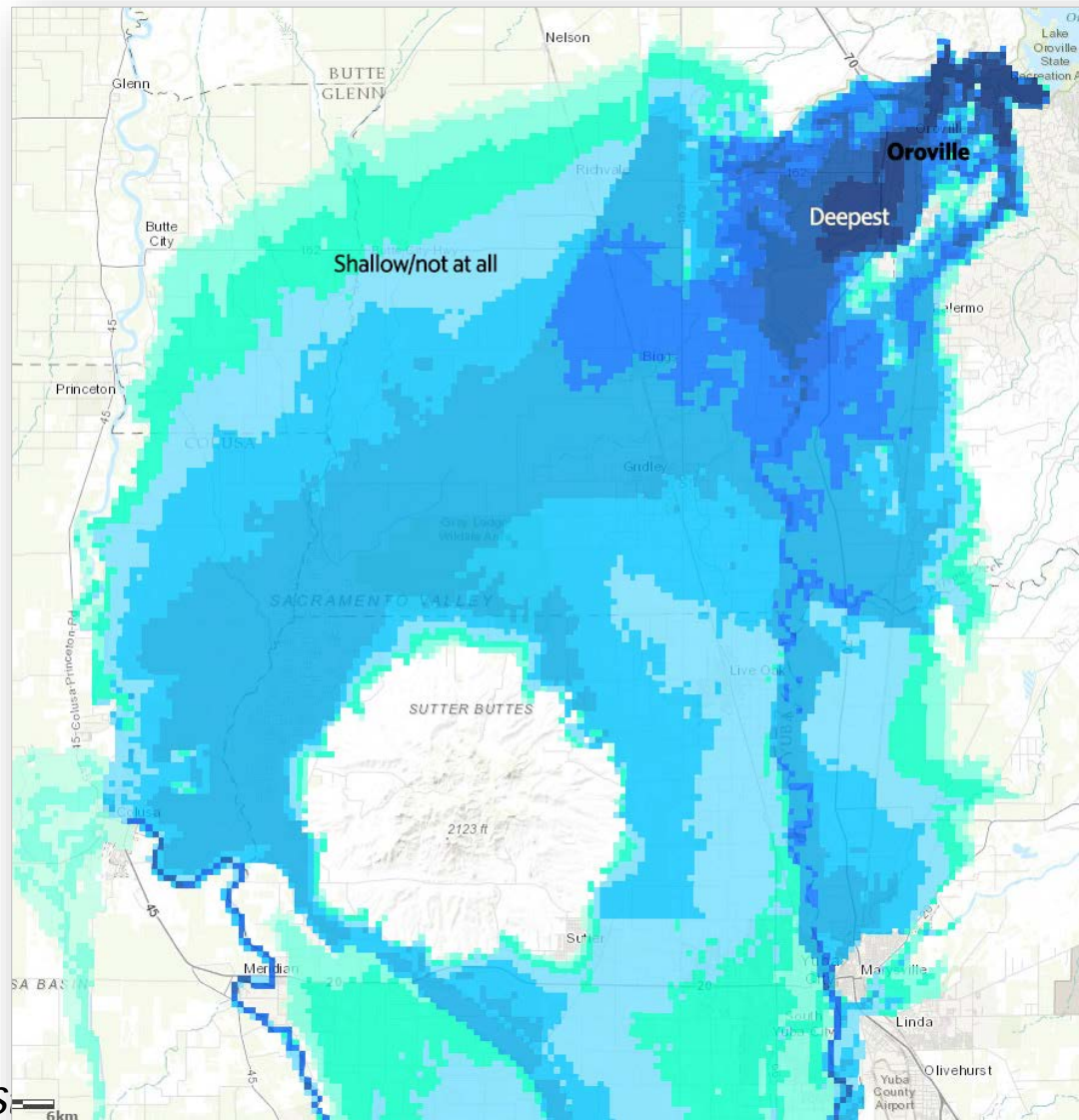
Auxiliary Spillway

Inundation Map

- Inundation map was only available for a breach of the Main Embankment.
- Was it the right map for this event?



Another View - Inundation Map



Evacuation



The Aftermath – Immediate Questions and Issues

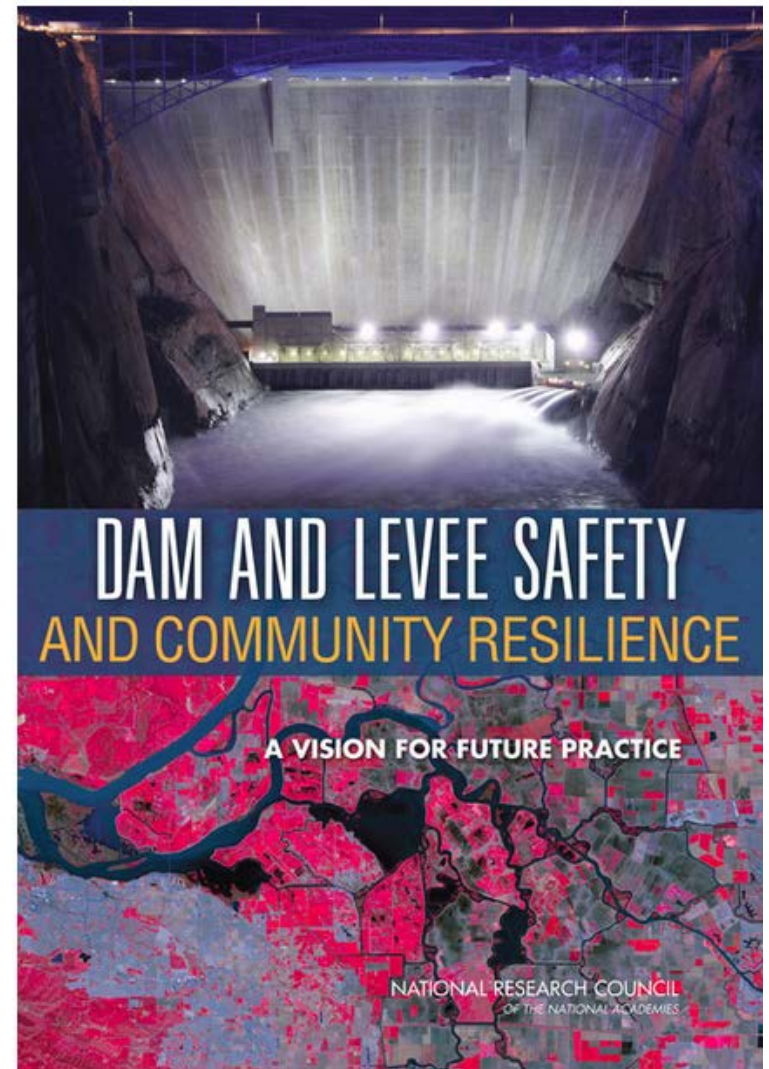
- The Oroville Incident raises a number of questions:
 - On the technical side - Why/how did this happen?
 - Was the owner prepared?
 - Was the community prepared?
- The technical and operational questions should be addressed/answered by a forensics team that recently started its work; their report should be available later this year.

More Fundamental Issues

- What does this event say about dam safety processes; about ownership, regulation, and community preparedness?
 - Responsible owner
 - Two of the ‘best’ regulatory agencies in the country
- How do the lessons of this (and other) events become more than simply identified – how do they get transformed into improved practices?

Dam Safety & Community Resilience

- FEMA asked the National Research Council of the National Academies to conduct a study on community resilience and dam and levee safety.
- Committee involved engineers, sociologists, economists, insurance industry, emergency managers, dam owners.
- Completed in 2012.



Resilience

Resilience: the capacity of a system to absorb change and disturbances, and still retain its basic structure and function—its identity” (Walker and Salt, 2006)

Fundamental Issue

The fundamental issue posed by FEMA was:

“How dam and levee safety programs may be broadened to include community- and regional-level preparation, response, mitigation, and recovery from potential infrastructure failure.”

The Broader Message Behind the Charge from FEMA

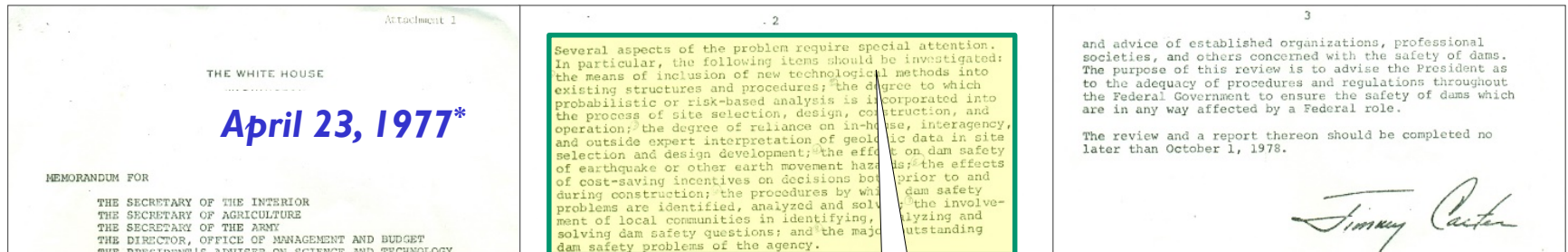
- In a post- 9/11 and Katrina world, the resilience of communities requires a greater engagement of infrastructure professionals (owners, regulators, consultants, emergency managers) and communities.
- The present day dam and levee safety program paradigm needs to be broadened.

Study Focus

The study looked at:

- Holistic systematic approaches to safety analysis,
- Communication and engagement of dam and levee safety professionals with communities, and
- Decision-making and decision-support systems.

A Memorandum from the President



The Need to Involve Communities in Addressing Dam Safety Questions/Issues

the involvement of local communities in identifying, analyzing and solving dam safety questions

of cost-saving incentives on decisions both prior to and during construction; the procedures by which dam safety problems are identified, analyzed and solved; the involvement of local communities in identifying, analyzing and solving dam safety questions; and the major outstanding dam safety problems of the agency.

Our Speakers

Mr. Tony Bennett

Ontario Power Generation
Director of Dam and Public Safety
Ontario, Canada

Professor Dennis Mileti

Professor Emeritus
University of Colorado

Mr. Steve Verigin

Senior Vice President, GEI Consultants, Inc.
(formerly Chief of the California Division of Safety of Dams)