

# California Department of Water Resources

*2017 in California – A Year for Floods, Fires, and  
Other Disasters*



Christy Jones, P.E.  
Deputy Director



***“Plans are worthless, but  
planning is everything.”***

***-Dwight Eisenhower***

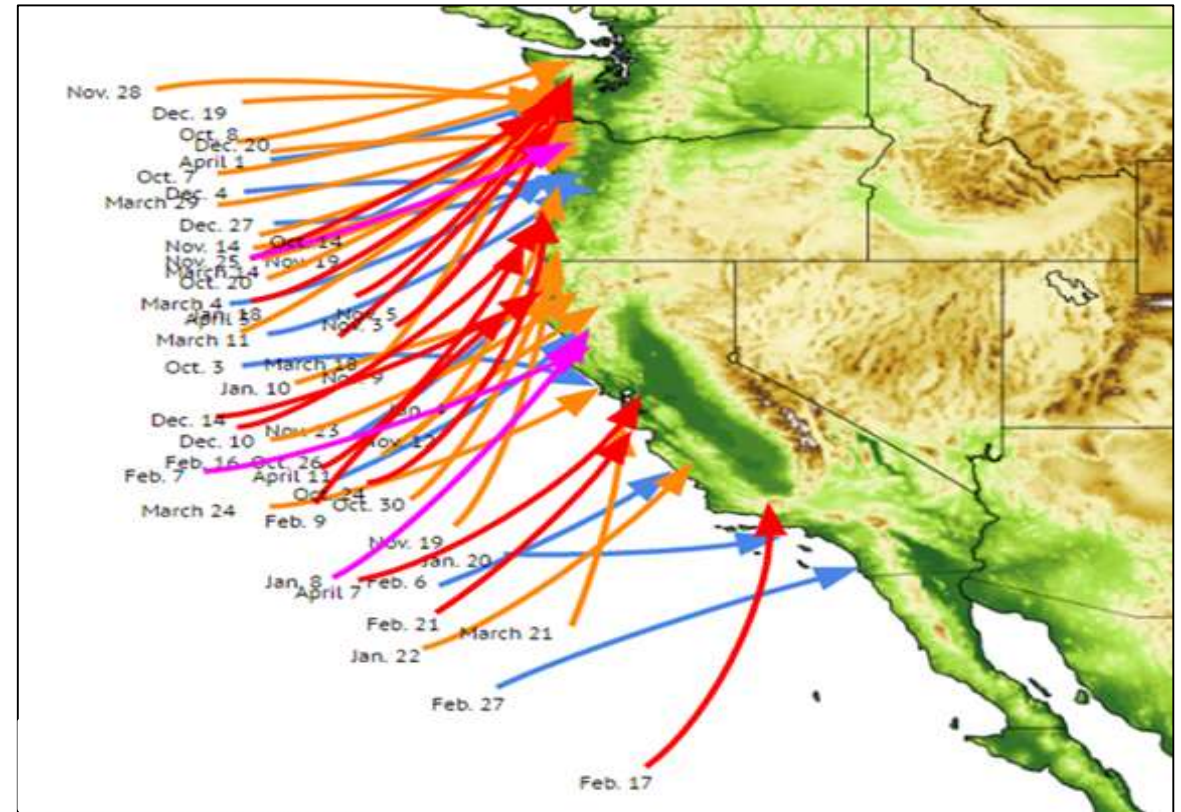
# What Happened in 2017?

Month	Description	Federal Declaration(s)
January	Heavy Precipitation – Multitude of flooding, Evacuations, Levee breaches	Yes
February	Heavy Precipitation – Oroville Spillways Emergency, Mudslides, Multitude of Flooding, Evacuations, Levee Breaches	Yes
March	Heavy Precipitation	No
April	Heavy Precipitation	No
May	Heavy Precipitation	No
June	Heavy Precipitation – Levee breach; Fires	No
July	Fires	Yes
August	Fires/Flooding in LA	Yes
September	Fires	Yes
October	Fires – Including the most destructive in CA history	Yes
November	Fires	No
December	Fires – Largest fire in CA history (followed by Heavy Precipitation in January 2018)	Yes

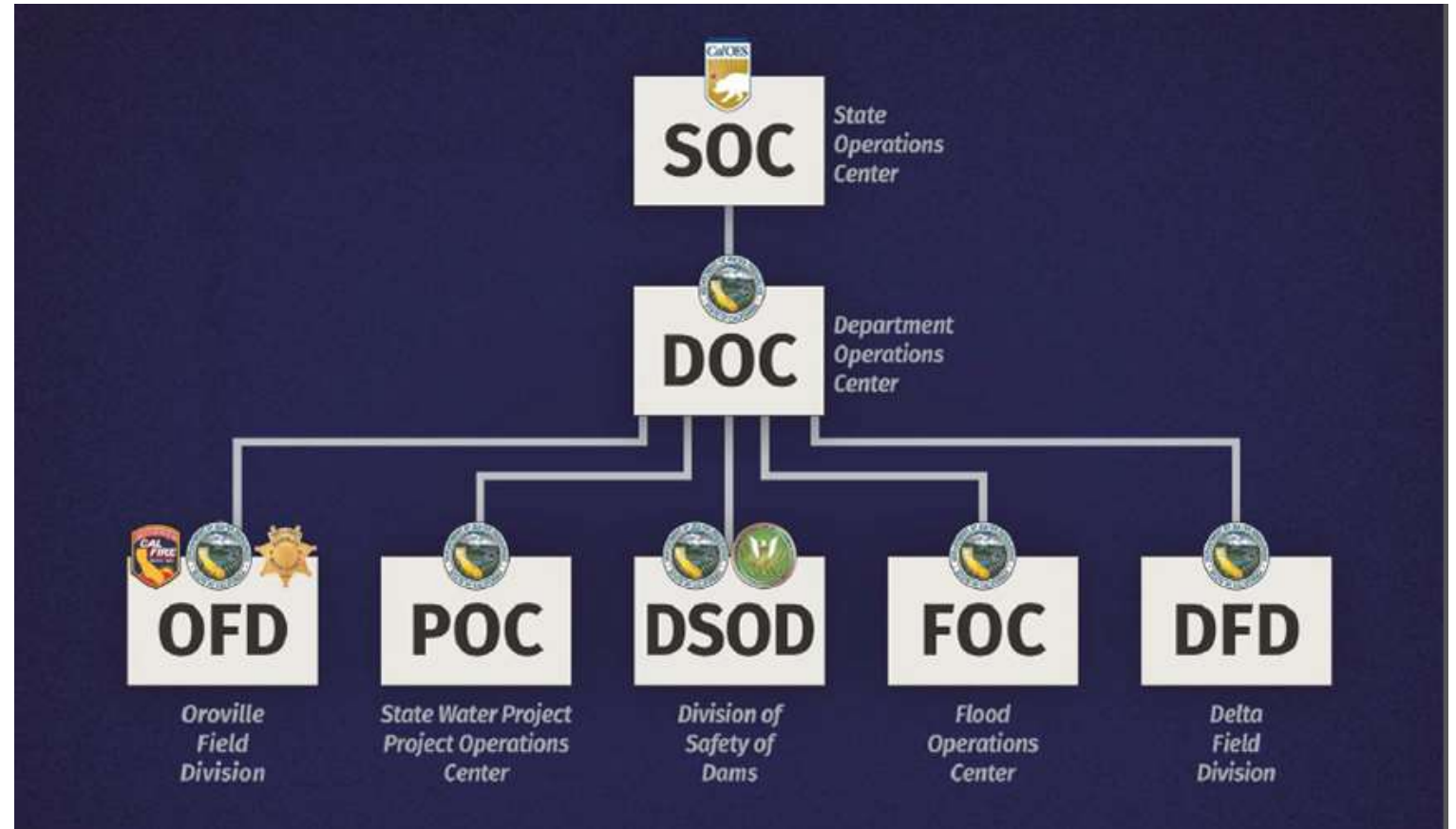


# Atmospheric Rivers

*Between October 1, 2016 and  
April 12, 2017  
numerous atmospheric rivers  
make landfall on  
the West Coast.*



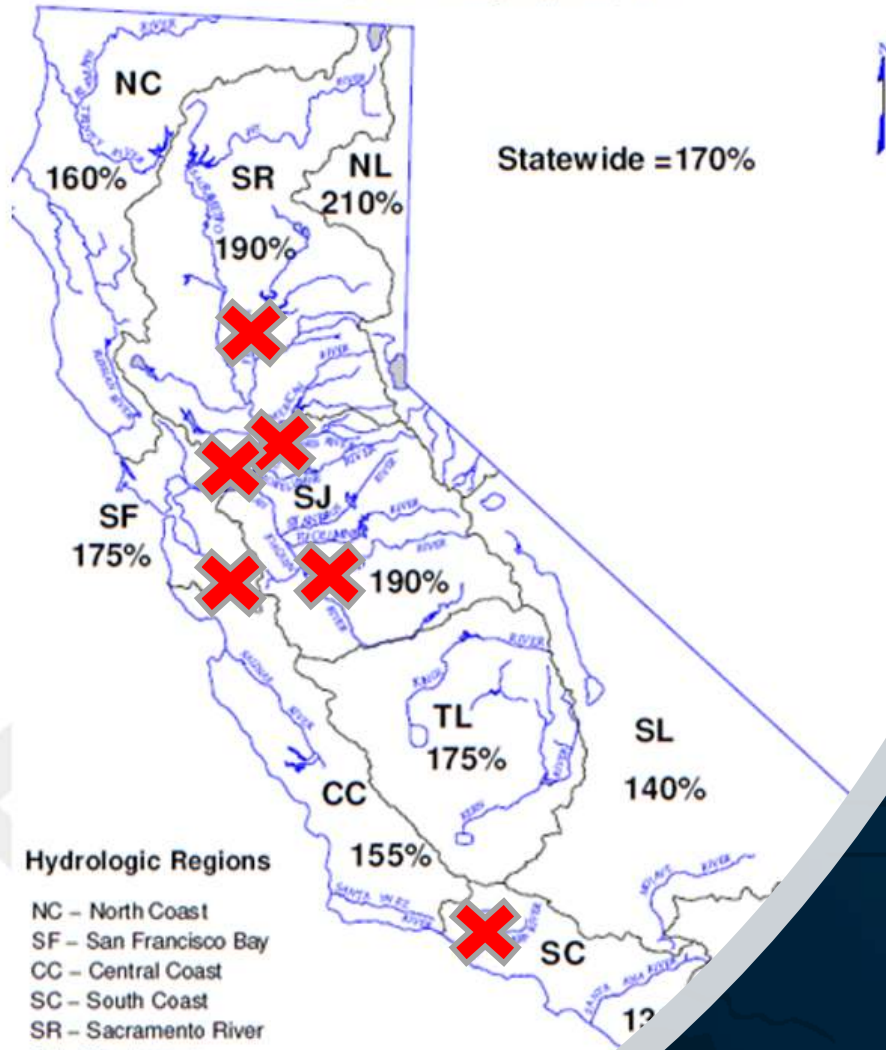
# *DWR's Emergency Structure 2017*



First time in California emergency response history that a state agency was embedded into the State Operation Center (SOC) to partner and streamline response efforts....  
Tuesday, February 14, 2017.



DEPARTMENT OF WATER RESOURCES  
CALIFORNIA COOPERATIVE SNOW SURVEYS  
SEASONAL PRECIPITATION  
IN PERCENT OF AVERAGE TO DATE  
October 1, 2016 through April 30, 2017



Hydrologic Regions

NC - North Coast  
SF - San Francisco Bay  
CC - Central Coast  
SC - South Coast  
SR - Sacramento River  
SJ - San Joaquin  
TL - Tulare Lake  
NL - North Lahontan  
SL - South Lahontan  
CR - Colorado River-Desert

# Flooding

# *City of Sacramento – Jan 2017*



Flood Fight with City  
of Sacramento  
partners

# *Yolo Bypass*

## *Jan 2017*

Imminent Threat State  
Technical Assistance

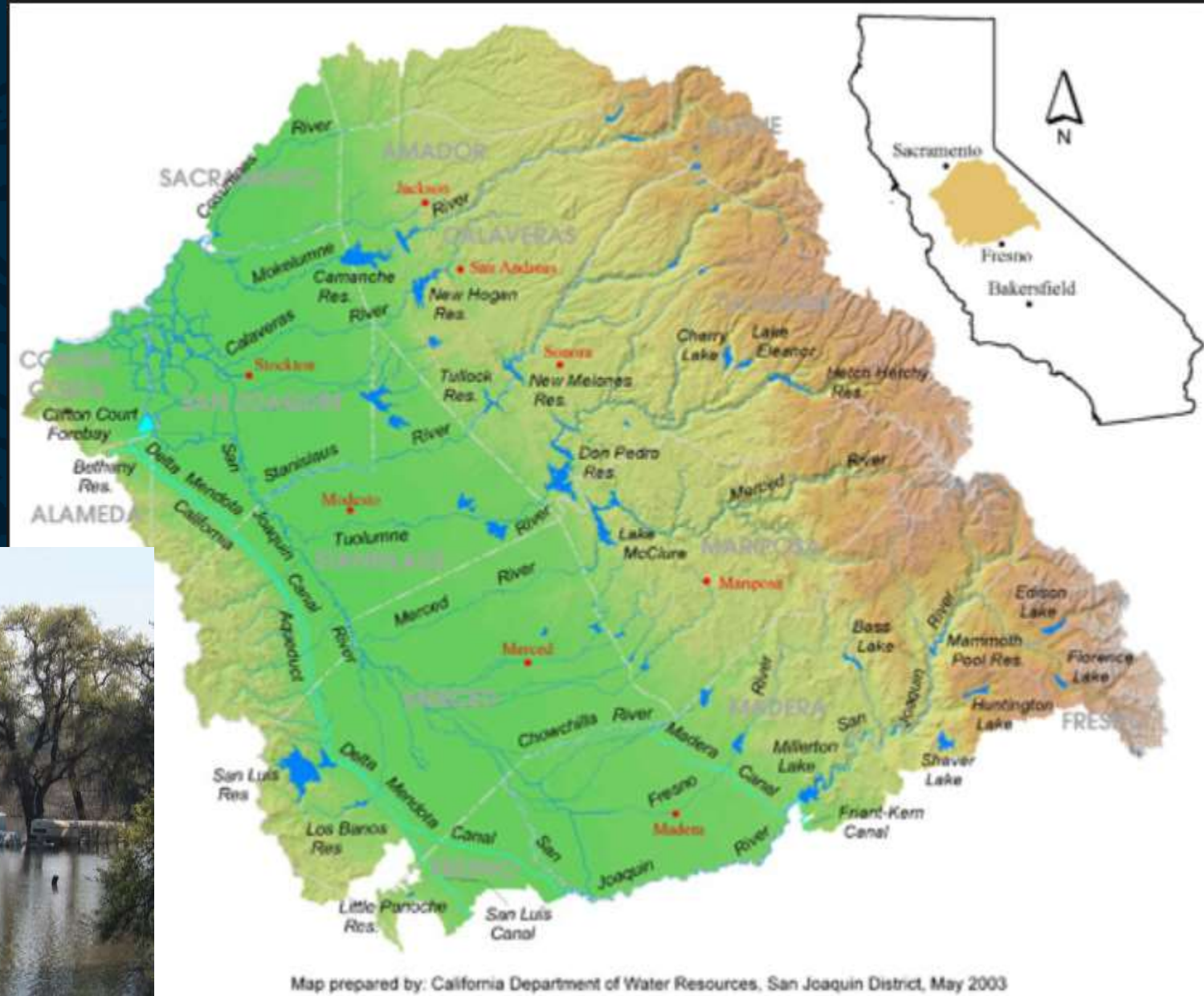


# *Feather River – Jan 2017*



Imminent Threat  
State Direct Assistance

# Coordinated Reservoir Operations



# Flooding in San Jose Feb 2017

COYOTE FLOODING 2-21-17 (101/CANAL)

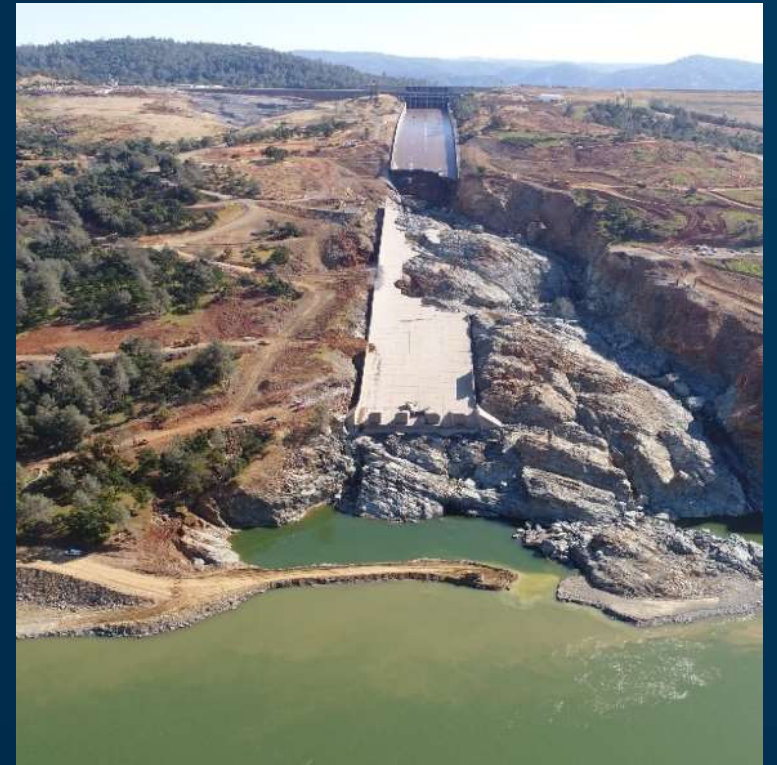


Photos courtesy of Santa Clara Valley Water District, Flooding Report Jan and Feb 2017

# Flash Flooding in Los Angeles

## Aug 2017





# Oroville

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# State Water Project Overview




- Largest state owned & operated water delivery system in the U.S.
- Serves 25 million Californians
- 750,000 acres of farmland
- 32 Storage Facilities
- 21 Pumping Plants
- 4 Pumping-generating Plants
- 8 Hydroelectric Plants
- 700 miles of Canals and Pipelines

An aerial photograph of a large dam and spillway system. In the background, a large reservoir is visible, surrounded by forested hills. The dam itself is a long, low structure with a central section where water is being released. To the left of the main dam, there is a smaller, steeper spillway where water is cascading down. The surrounding landscape is a mix of green forest and brown, cleared areas. The sky is overcast with grey clouds.


**Emergency  
Spillway**

**Main/Gated  
Spillway**

**Hyatt  
Powerplant**

A wide-angle photograph of a large concrete dam. Water is flowing over the top of the dam, creating a white, frothy cascade. The dam is flanked by steep, forested hillsides. In the background, several tall electrical transmission towers are visible against a clear blue sky. The foreground shows the turbulent water at the base of the dam, with white foam and spray.

**Monday  
February 6<sup>th</sup>**



Tuesday  
February 7<sup>th</sup>

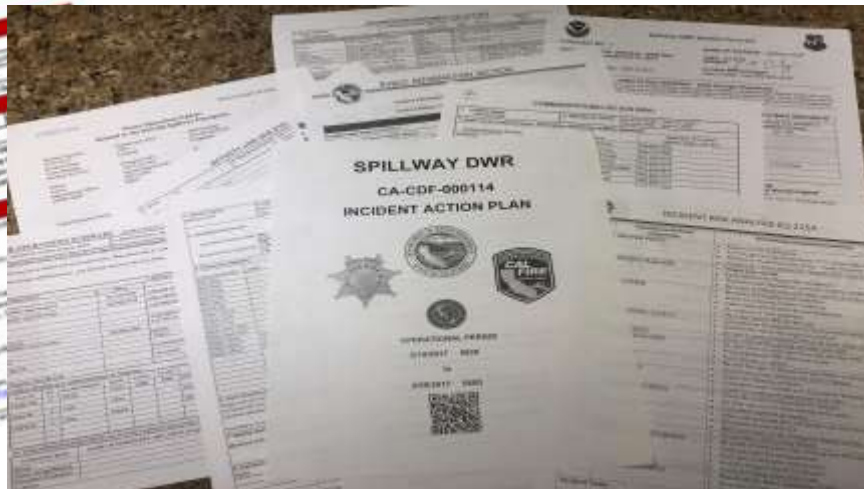
# February 7

## Deck and Foundation Erosion

150 ft. Wide  
450 ft. Long  
30-40 ft. Deep



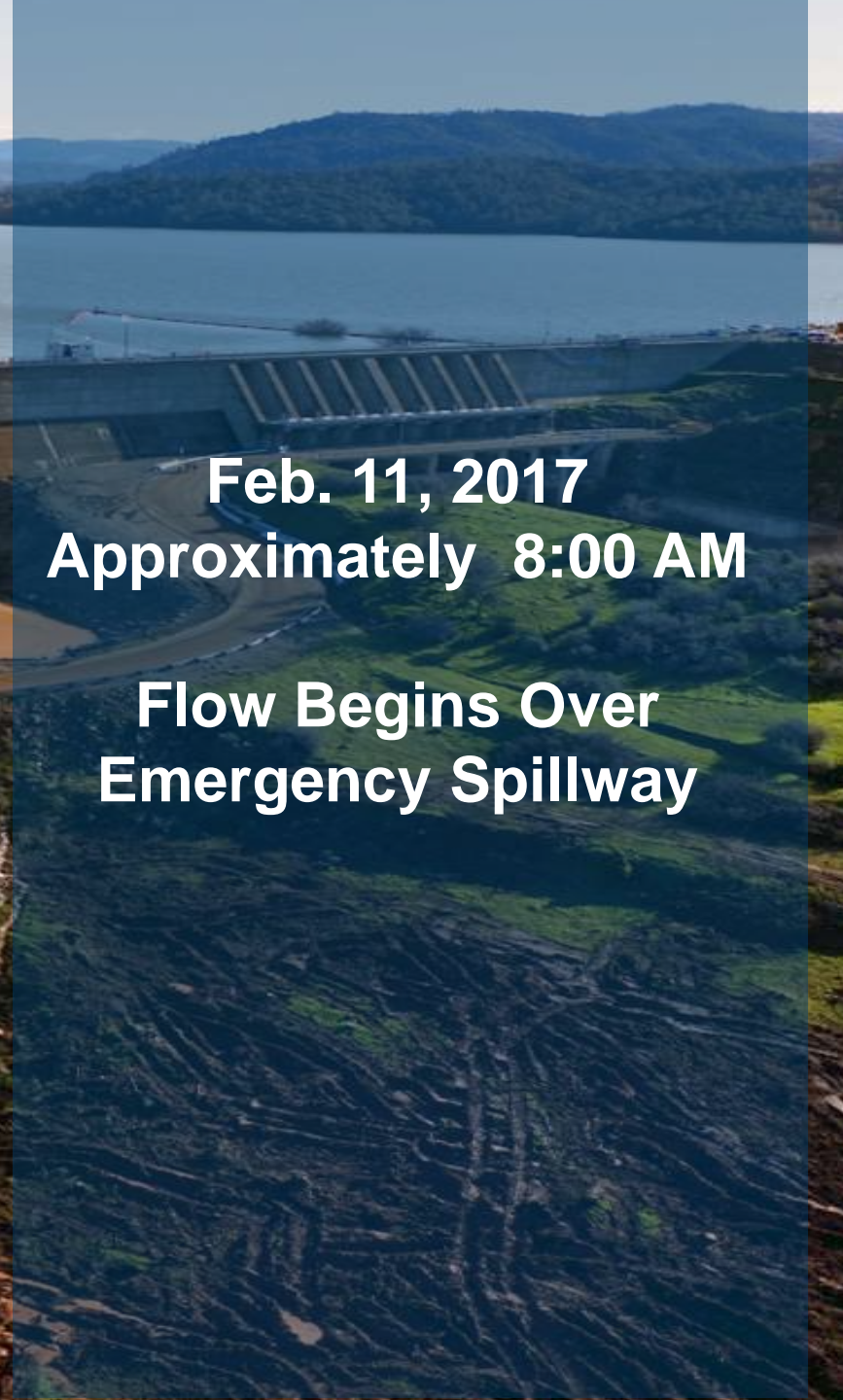
# Cal Fire joins the Unified Command February 9 and over night sets up an Incident Command Post and worked side by side with our team for almost 3 weeks



## Assistance:

IAP, public communication, internal paperwork, meetings and more....





**Feb. 11, 2017**  
**Approximately 8:00 AM**

**Flow Begins Over  
Emergency Spillway**

**Water coming over both the  
Emergency Spillway and the Flood Control Spillway  
morning of February 12, 2017**





Sunday, February 12  
3:30 PM

Speed of erosion  
begins to increase

Erosion moves up  
toward the emergency  
spillway at about  
30 feet per hour

**February 12**  
Approximately 4:00 PM  
Flows increase to  
100,000 cfs



# Butte County Sheriff Kory Honea Ordered Evacuation February 12



**Butte County Sheriff**

February 12 · 🌐

This is an evacuation order.

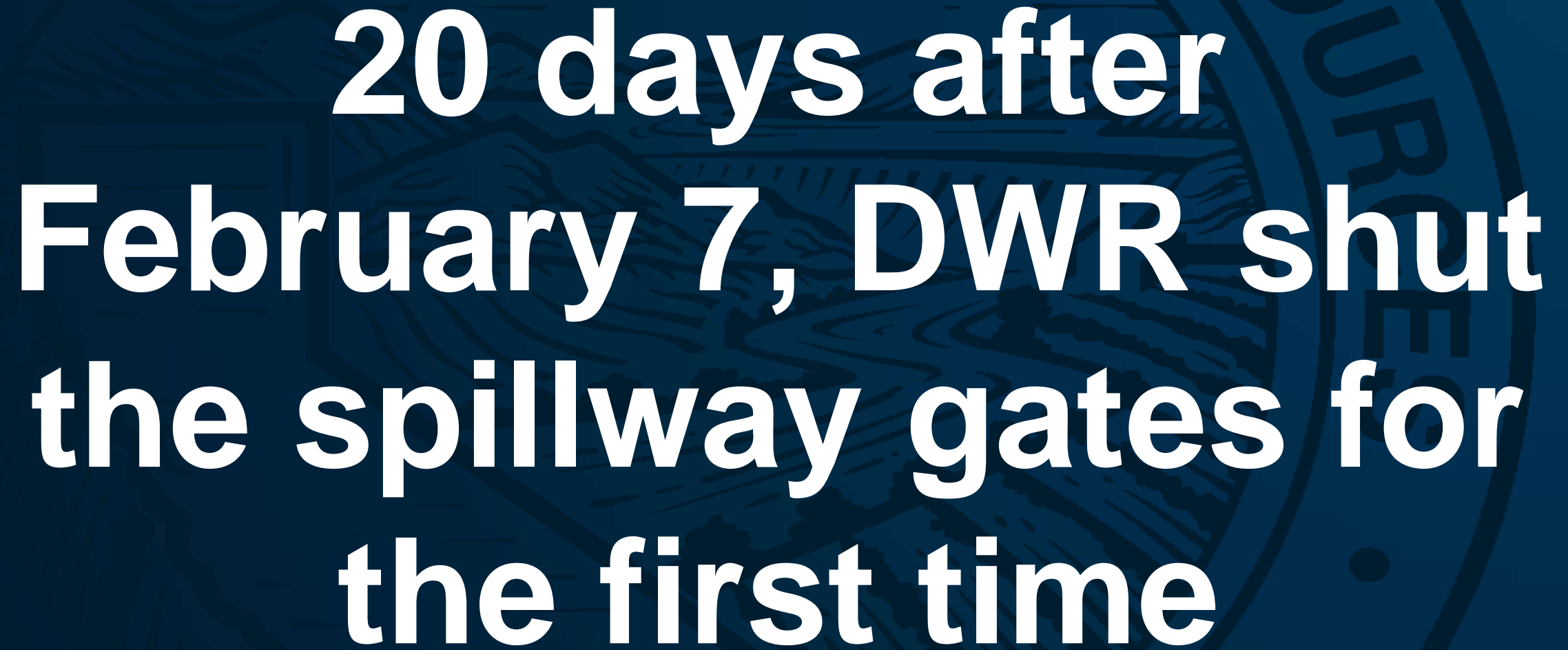
Immediate evacuation from the low levels of Oroville and areas downstream is ordered.

A hazardous situation is developing with the Oroville Dam auxiliary spillway. Operation of the auxiliary spillway has lead to severe erosion that could lead to a failure of the structure. Failure of the auxiliary spillway structure will result in an uncontrolled release of flood waters from Lake Oroville.

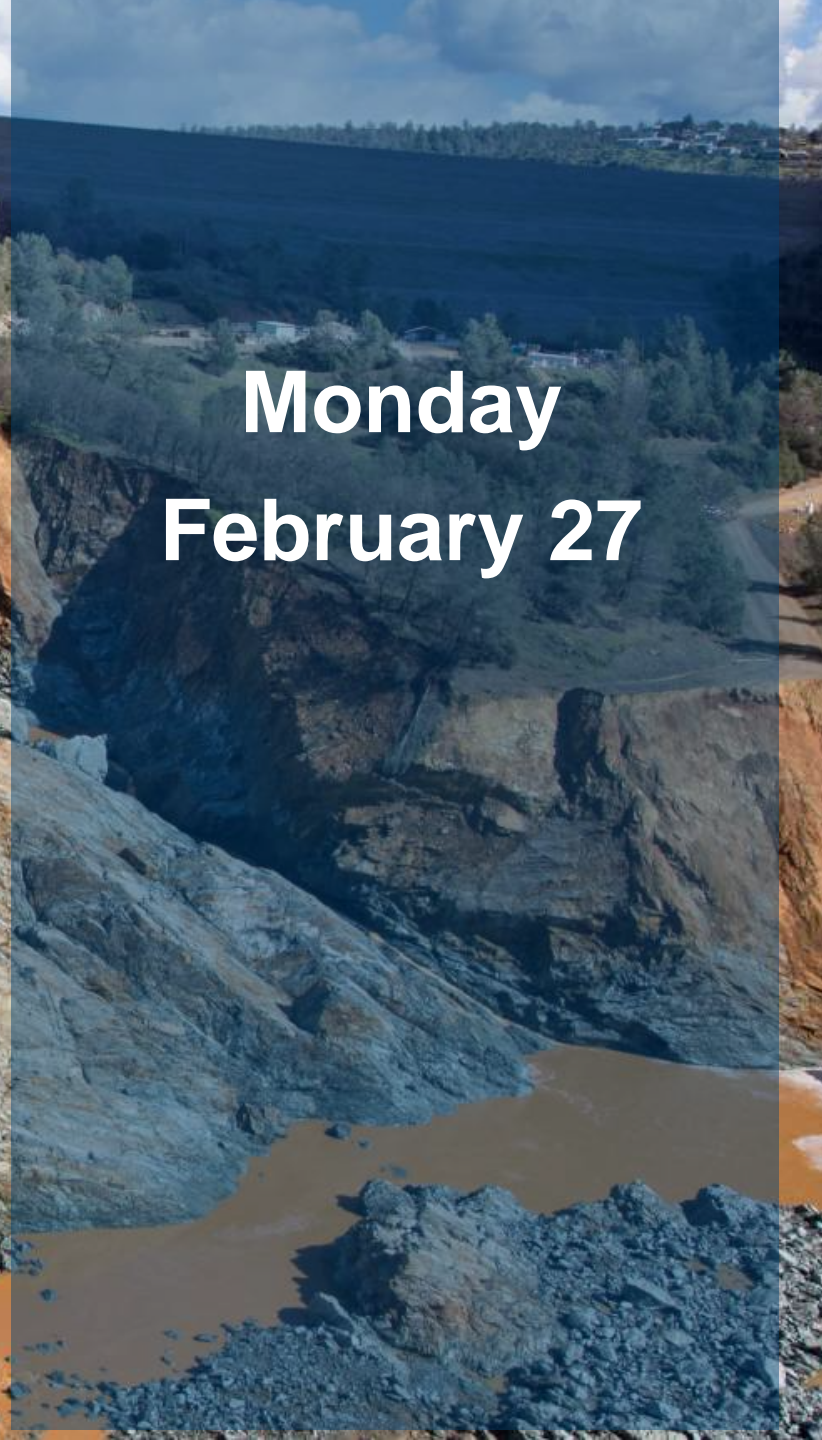
In response to this developing situation, DWR is increasing water releases to 100,000 cubic feet per second.

Immediate evacuation from the low levels of Oroville and areas downstream is ordered.

This in NOT A Drill. This in NOT A Drill. This in NOT A Drill.



**20 days after  
February 7, DWR shut  
the spillway gates for  
the first time**



**Monday  
February 27**

# Debris Dam – Diversion Pool on February 27, 2017



Over 1 million cubic yards removed in 9 days with 36 land and barge based excavators



**Geologists  
begin their  
work**

# State Partners

- Department of Parks & Recreation
- Department of Fish & Wildlife
- CAL FIRE
- California Conservation Corps.
- California Highway Patrol
- California National Guard
- Office of Emergency Services
- CalTrans

# Local & Other Partners

- Butte County Sheriff, OES, Public Works
- City of Oroville, Police Dept., Fire Dept.
- Gridley-Biggs Police Department
- Oroville Hospital
- Bureau of Indian Affairs
- PG&E
- Red Cross
- Association of State Dam Safety Officials
- U.S. Society on Dams

# Regulators & Oversight



## Federal Energy Regulatory Commission

Dam operational license, Inspections, input on construction, regulator



## CA Division of Safety of Dams

Operations, maintenance, regulatory compliance, inspections



## Association of State Dam Safety Officials

Industry guidance, selection of Independent Forensic Team



## US Society on Dams

Industry guidance, selection of Independent Forensic Team



## US Army Corps of Engineers

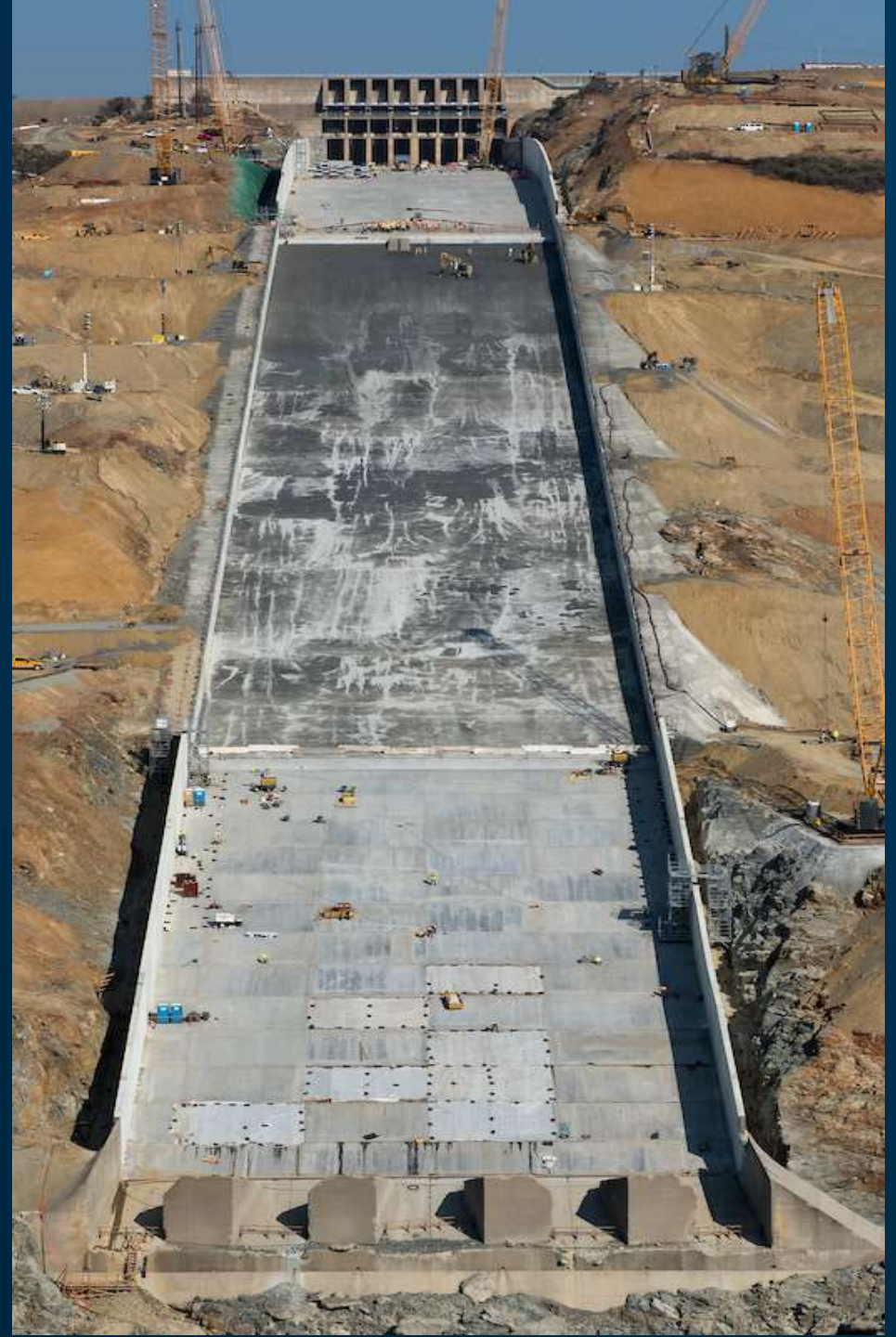
Response Assistance & Dam Flood Control Operations

# Spillway Repair Progress



The November 1 milestone  
was accomplished.

The main spillway could pass  
100,000 cfs  
for this last  
winter season.



Phase 2  
Work  
began  
May 2018

Removal of  
the upper  
portion of  
the spillway



Main Spillway

June 2018



# Emergency Spillway

June 2018





Cal Fire employee surveys damage caused by the Tubbs Fire in the Coffey Park neighborhood of Santa Rosa, California on October 13, 2017. [ELIJAH NOUVELAGE/GETTY IMAGES](#)



Fire damage is seen from the air in the Coffey Park neighborhood of Santa Rosa, California on October 11, 2017. [JUSTIN SULLIVAN/GETTY IMAGES](#)



Extensive residential devastation is seen after wildfires ripped through the Coffey Park neighborhood of Santa Rosa, California on October 13, 2017.

# *Fires, Debris Flows, and Landslides*



Along with landslides, Caltrans will have to repair the asphalt on Highway

## *Highway 1 Issues – Pfeiffer Canyon Bridge*



A landslide in the Big Sur Valley damaged the Pfeiffer Canyon Bridge, forcing the



**March 8**

Topographic 3-D imagery from USGS shows the extent of the Mud Creek landslide over time. (Joe Fox/@latimesgraphics)



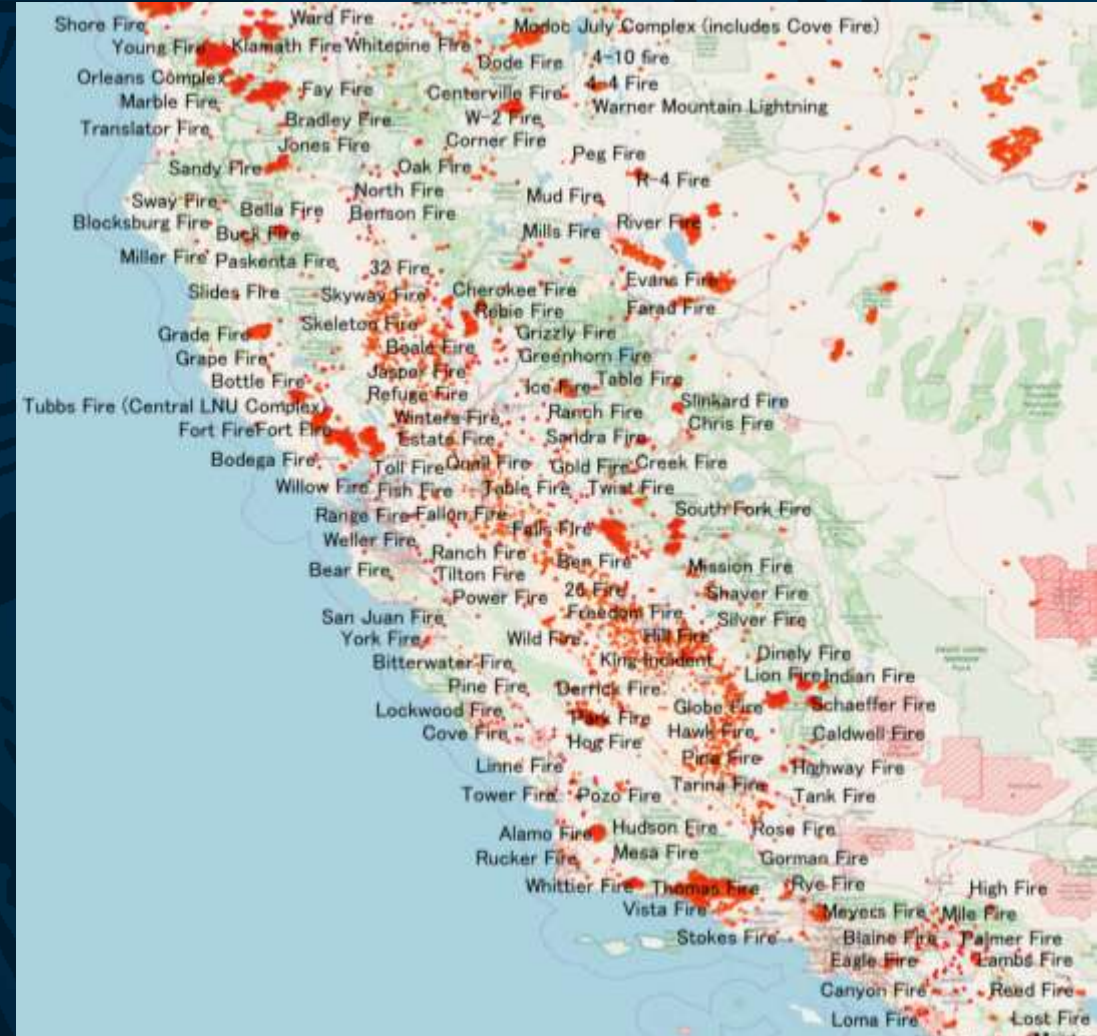
**May 31**

Topographic 3-D imagery from USGS shows the extent of the Mud Creek landslide over time. (Joe Fox/@latimesgraphics)

# California's Wildfires

2017

- 9,133 Fires
- 1,381,405 acres
- \$13,028,000,000
- 810 Structures Damaged
- Largest Fire in CA History
- 9,470 Structures Destroyed
- Most Destructive Fire in CA History



# October 2017 Fire Siege

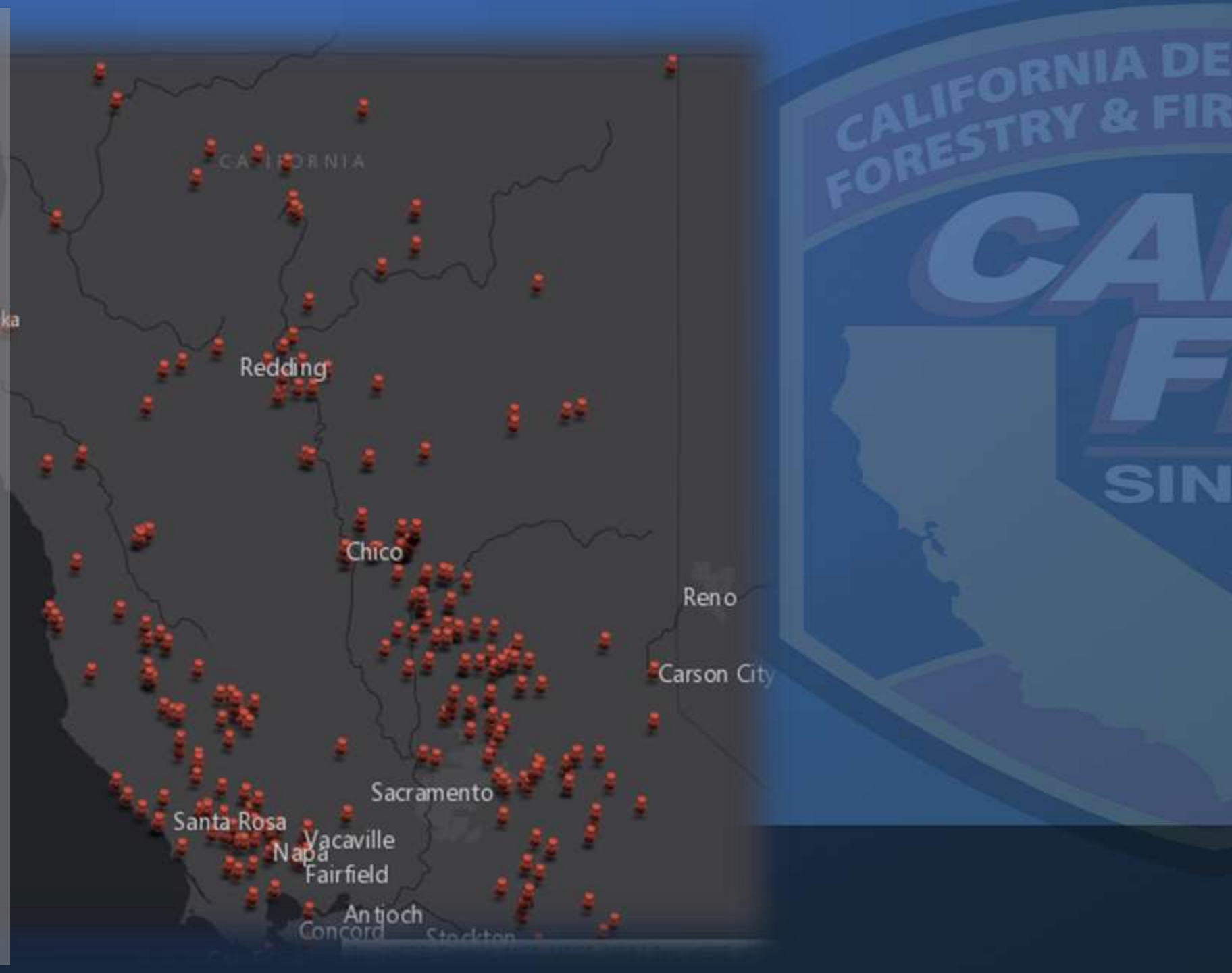


In the 48 hours spanning Sunday, October 8th and Monday, October 9th, 172 wildfires broke out across CAL FIRE's Northern Region. During that 48-hour period, the Sonoma-Lake-Napa Emergency command center alone – one of 12 CAL FIRE emergency command centers in the Northern Region – received 3,662 calls for help.

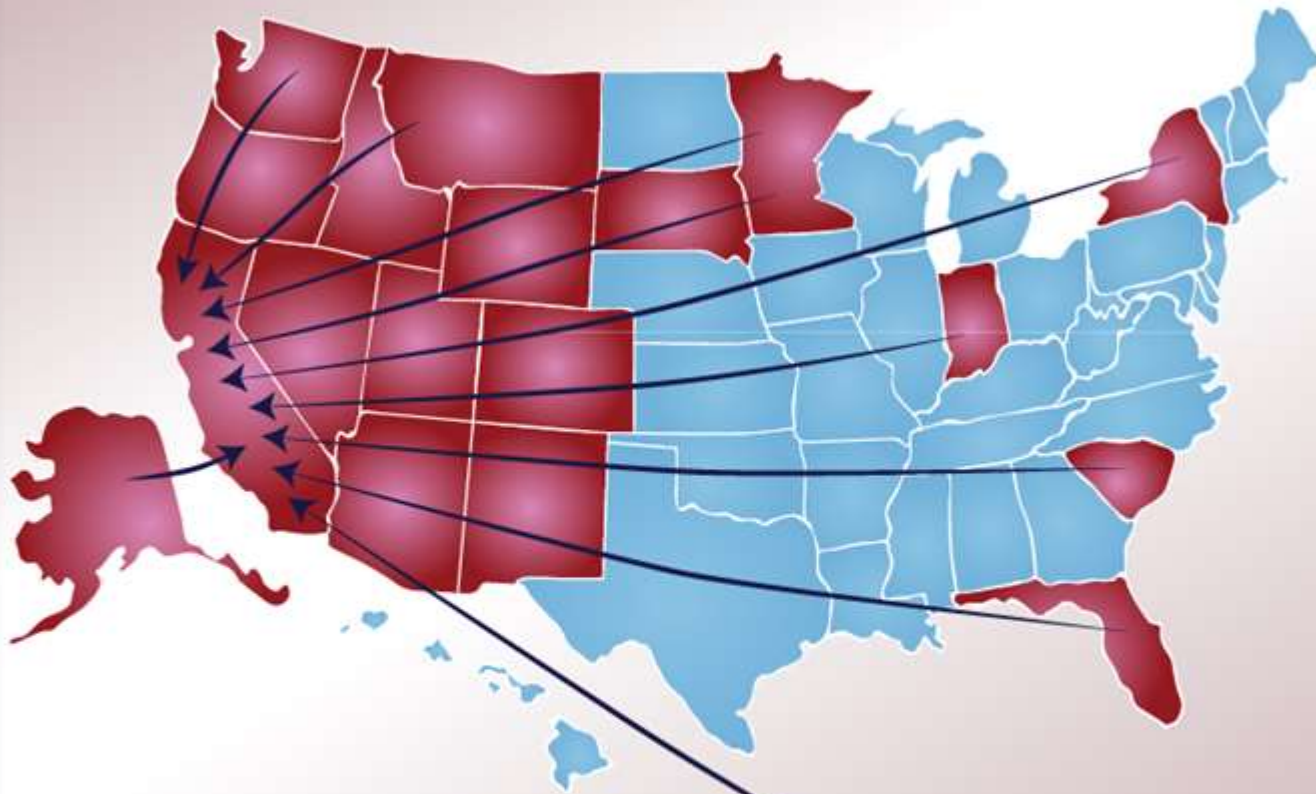
Of the initial 172 wildfires that ignited during what is being referred to as the October 2017 Fire Siege, 18 of them grew into large, fast moving conflagrations fanned by record-breaking strong winds.

During the siege 8,920 structures were destroyed and 736 structures were damaged.

44 people lost their lives.



# CALIFORNIA GETS ASSISTANCE TO BATTLE WILDFIRES



## 17 STATES AND 1 COUNTRY Offer Mutual Aid to Assist in Firefighting Efforts

Fire Engines: ..... **266**  
Fire Crews: ..... **79**  
Additional Personnel: ..... **56**

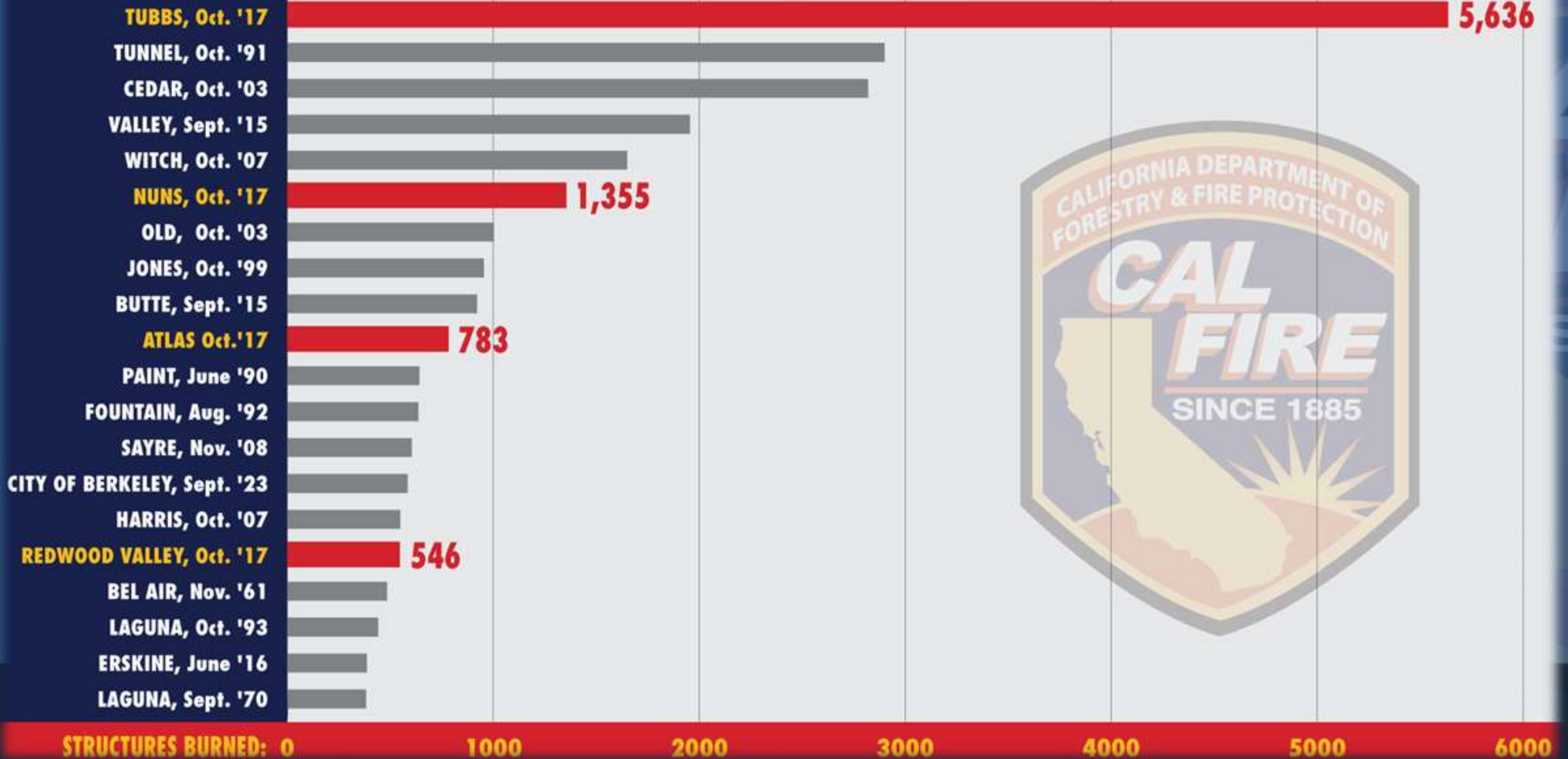


**Australia**

Out of state resources contributed 266 additional engines, 79 additional fire crews and 56 additional overhead to the fire siege.



# TOP 20 MOST DESTRUCTIVE CALIFORNIA WILDFIRES





## Recovery

Work continues by crews to clean up after the October fires. Crews are installing straw wattles and removing brush from water ways to help protect areas from potential flooding and erosion ahead of winter storms. Two CAL FIRE Incident Management Teams were activated after the fires were controlled to assist in managing the recovery efforts.



# December 2017 Fires



*Photo from CBS News*

In the two weeks subsequent to Monday, December 4<sup>th</sup>, 122 wildfires broke out under Red Flag Santa Ana wind conditions across CAL FIRE's Southern Region.

Of the initial 122 wildfires that ignited during what is being referred to as the December 2017 Santa Ana Fire Siege, six of them grew into large, fast moving conflagrations fanned by strong winds and critically dry conditions. Some areas were reporting 1% relative humidity readings, while others were even reporting as low as 0%.

During the siege, over 1,370 structures were destroyed and over 440 structures were damaged.

2 people lost their lives, including CAL FIRE Engineer Cory Iverson.



# TOP 20 LARGEST CALIFORNIA WILDFIRES

THOMAS, DEC. '17

281,893

CEDAR, OCT. '03

RUSH, AUG. '12

RIM, AUG. '13

ZACA, JULY '07

MATILIJIA, SEPT. '32

WITCH, OCT. '07

KLAMATH THEATER COMPLEX, JUNE '08

MARBLE CONE, JULY '77

LAGUNA, SEPT. '70

BASIN COMPLEX, JUNE '08

DAY FIRE, SEPT. '06

STATION, AUG. '09

ROUGH, JULY '15

MCNALLY, JULY '02

STANISLAUS COMPLEX, AUG. '87

BIG BAR COMPLEX, AUG. '99

HAPPY CAMP COMPLEX, AUG. '14

SOBERANES, JULY '16

CAMPBELL COMPLEX, AUG. '90

Just before 6:30 p.m. on Monday, December 4<sup>th</sup>, 2017 the first of what ultimately would be six large wildfires broke out under Red Flag Santa Ana wind conditions. The Thomas fire started north of Santa Paula in Ventura County and would ultimately go on to destroy 1,063 structures, take the lives of two people, including CAL FIRE Engineer Cory Iverson, and burn over 280,000 acres, making it the largest wildfire in California's recorded history.

ACRES BURNED: 0

50,000

100,000

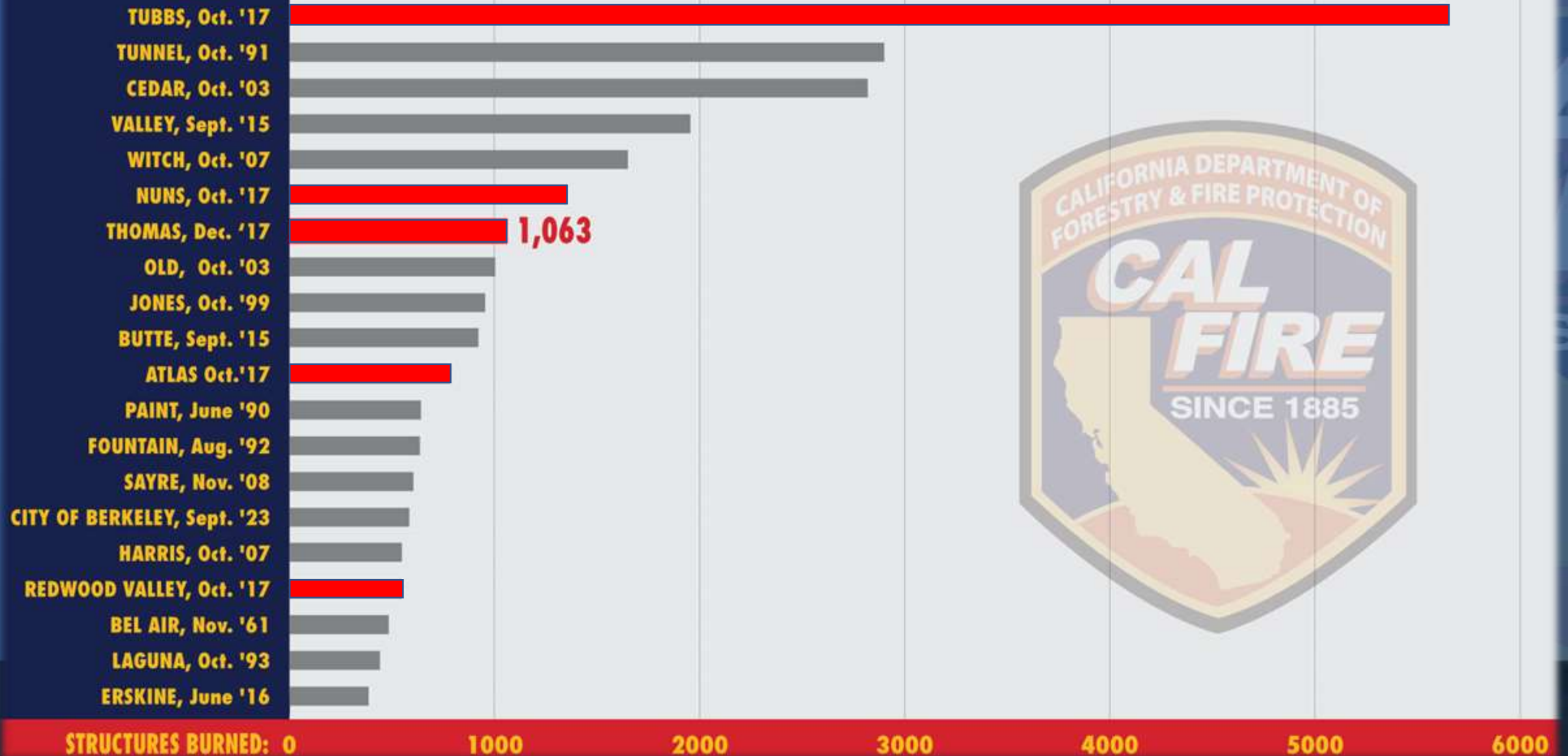
150,000

200,000

250,000

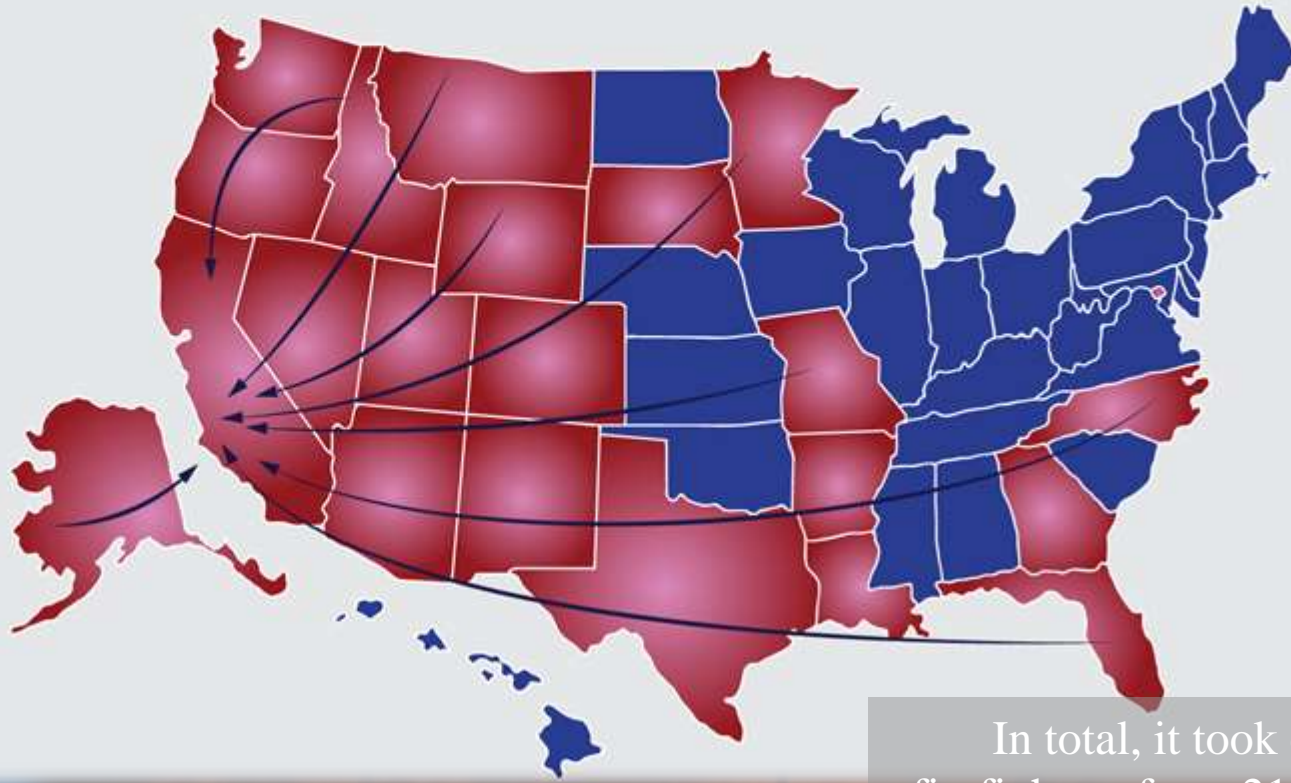
300,000

# TOP 20 MOST DESTRUCTIVE CALIFORNIA WILDFIRES



# CALIFORNIA GETS ASSISTANCE TO BATTLE SOUTHERN CALIFORNIA WILDFIRES

**21  
STATES  
PROVIDED  
MUTUAL  
AID**



In total, it took over 8,700 firefighters from 21 states to battle the six large fires making up the December, 2017 Santa Ana Fire Siege.



# Recovery

Crews continued repair work in areas affected by the December fires. However, on January 9<sup>th</sup>, 2018, efforts abruptly shifted after these fire ravaged areas were met with days of the heaviest rain fall experienced in nearly a year.

The scorched soil, due to intense heat from the fires, were unable to absorb the more than 5.5 inches of rain that had fallen over the course of only 2 days. Additionally, the lack of vegetation allowed for increased rates of erosion.

This combination led to catastrophic flooding and devastating mud slides that consumed the same areas impacted by the December 2017 Santa Ana Fire Siege and claimed several lives.

Crews continue to assist in the recovery and repair efforts that follow both these natural disasters.



# *Debris Flows*

*January 9, 2018*



# *Debris Flows*

## *Choke Points*

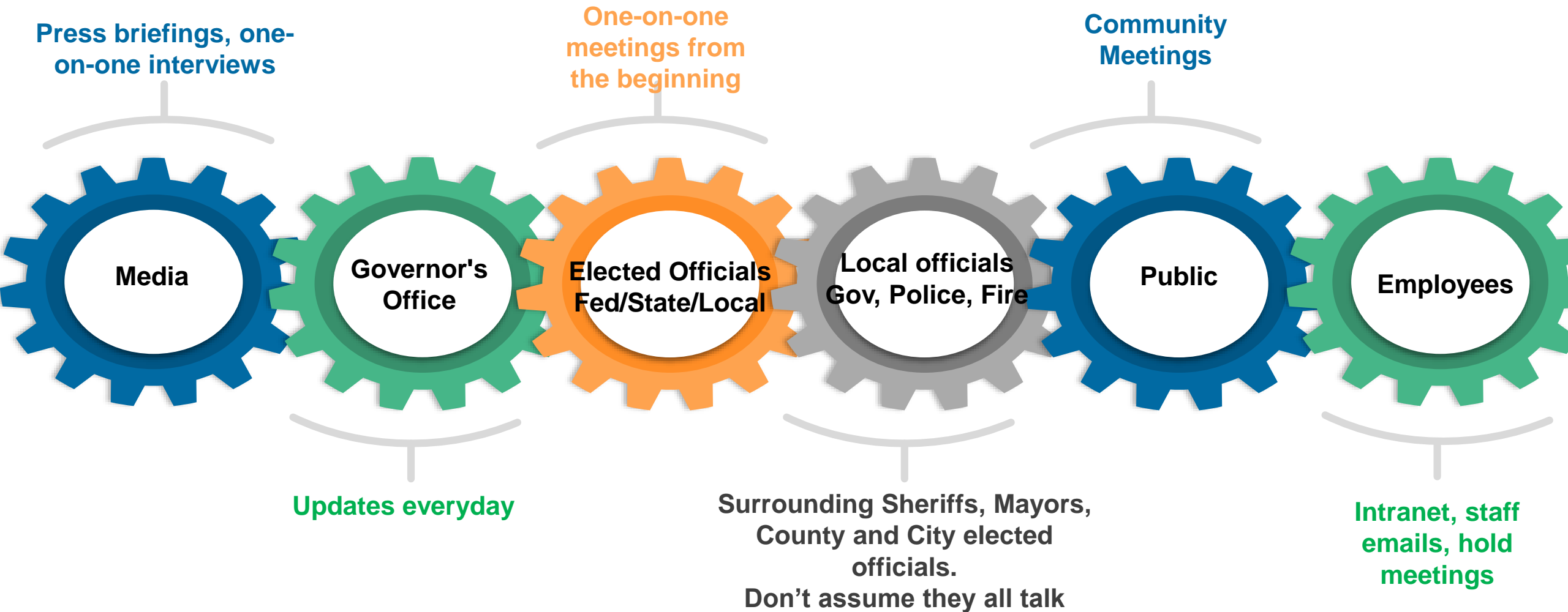


# Communication



# Communication Gear

Daily E-blasts for months, media briefings, social media, website, daily cooperative meetings, YouTube, on-site cameras





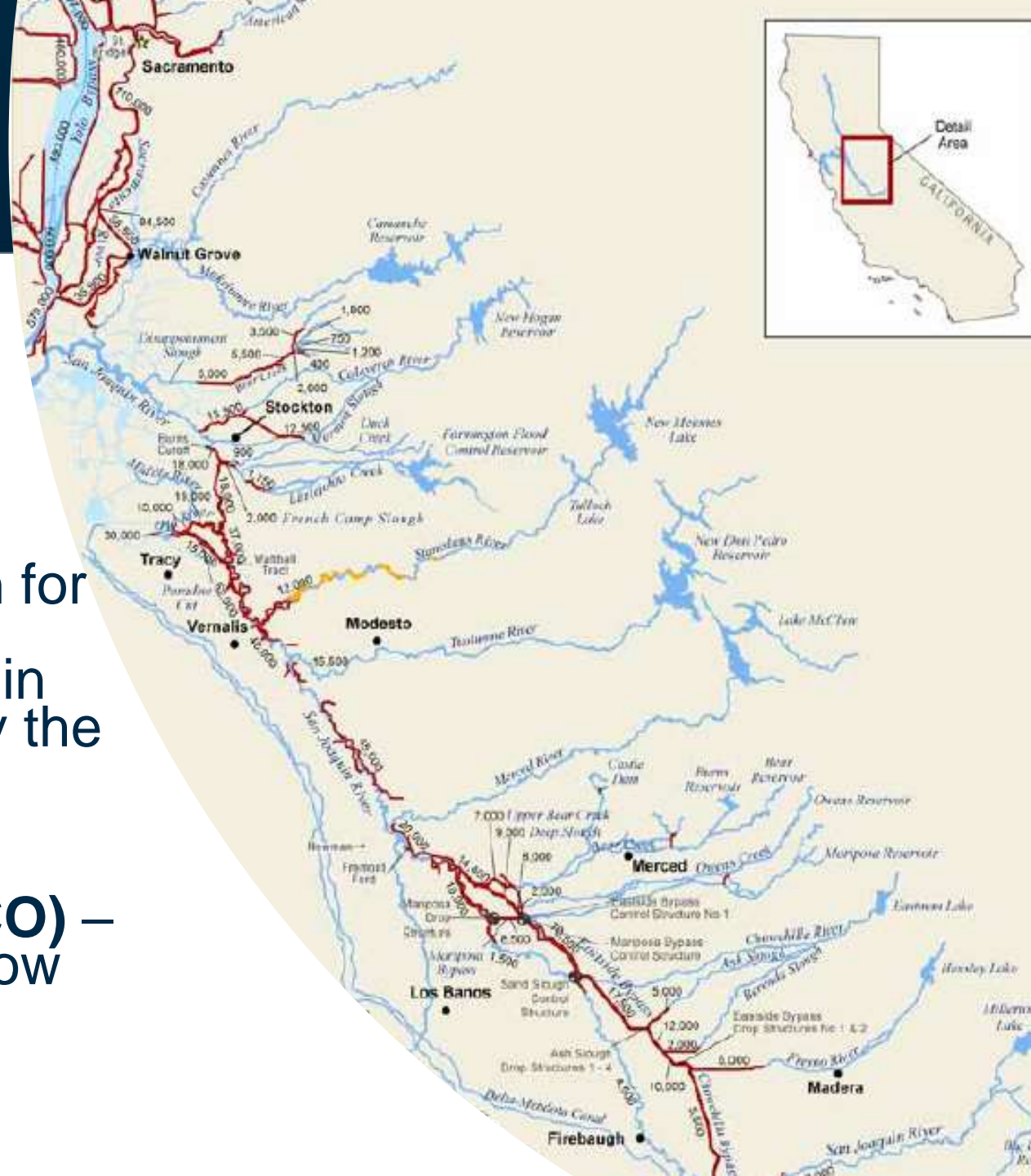
We tell the world to  
Be Prepared!!

*But is your organization  
Prepared?*



# Plans/Projects Currently in Place

- **Central Valley Flood Protection Plan (CVFPP)** – Strategic and long-range plan for improving flood risk management in the Central Valley. Guides state participation in managing flood risk in areas protected by the State Plan of Flood Control.
- **Forecast-Coordinated Operations (F-CO)** – Reduce peak flows through better river flow forecasting and improved coordinated reservoir operations.



### STAFF

Backups upon  
backups: Over 1,000  
employees deployed  
to Oroville.

### START TALKING NOW!

Set up working group  
meetings with  
external agencies.

### DOCUMENTATION

it is going to be  
around for awhile....  
Where is it stored and  
does everyone have  
access to it?

### COMMUNICATION

I DARE you to OVER  
communicate.

### TRAINING

Are you sure you've  
trained enough?  
Never.

### THE LITTLE THINGS

Is the voicemail on  
your cell phone set  
up?

### TRY LIVING WITHOUT YOUR NETWORK

Does your IT department  
realize just how  
important they are?

### LONG HOURS = FOOD

Do you know where and  
how you will get your  
next meal?

*Just a Few Lessons Learned*

# *Just a Few Actions Taken*

## **AFTER ACTION REPORT**

Finalize the After Action Report – 100's of interviews and group hotwashes.

## **LEGISLATION CHANGES**

New legislation to update all inundation maps for dams in California.

## **MEET & GREETs**

Met with county sheriff's and downstream emergency managers for all dams in the State Water Project.

## **STATE WATER PROJECT**

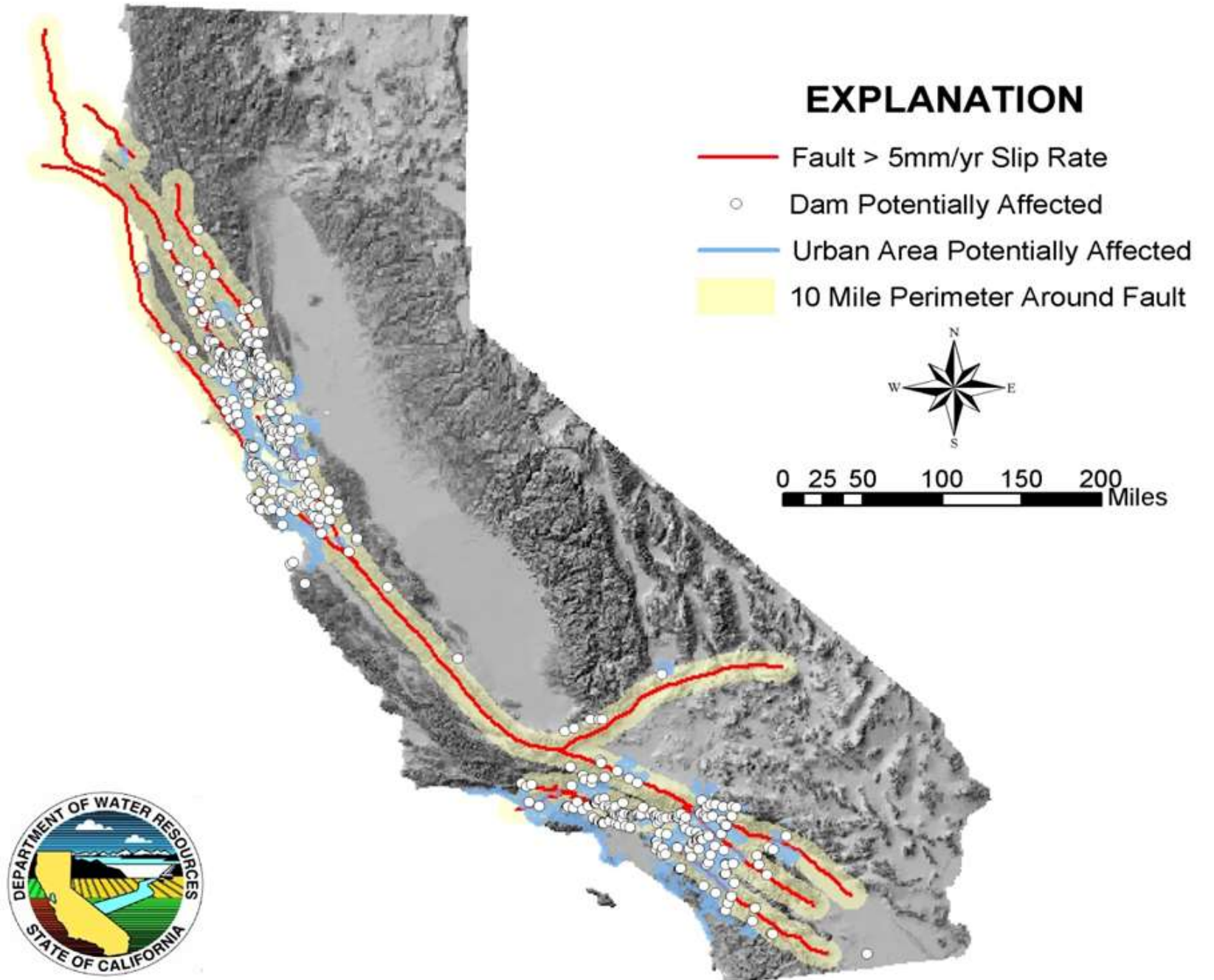
Continue "Meet and Greet's" for all counties that the State Water Project touches.

## **UPDATE MATERIALS**

Update DWR Emergency Response Plan, Continuity of Operations Plan. Create All Hazards Plan.

Train, train, train.

# Dams in CA located on faults



2017 Mon 14:10:12

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***“It does not do to leave a live dragon out of your calculations, if you live near him.”***

***-J.R.R. Tolkien, The Hobbit***

