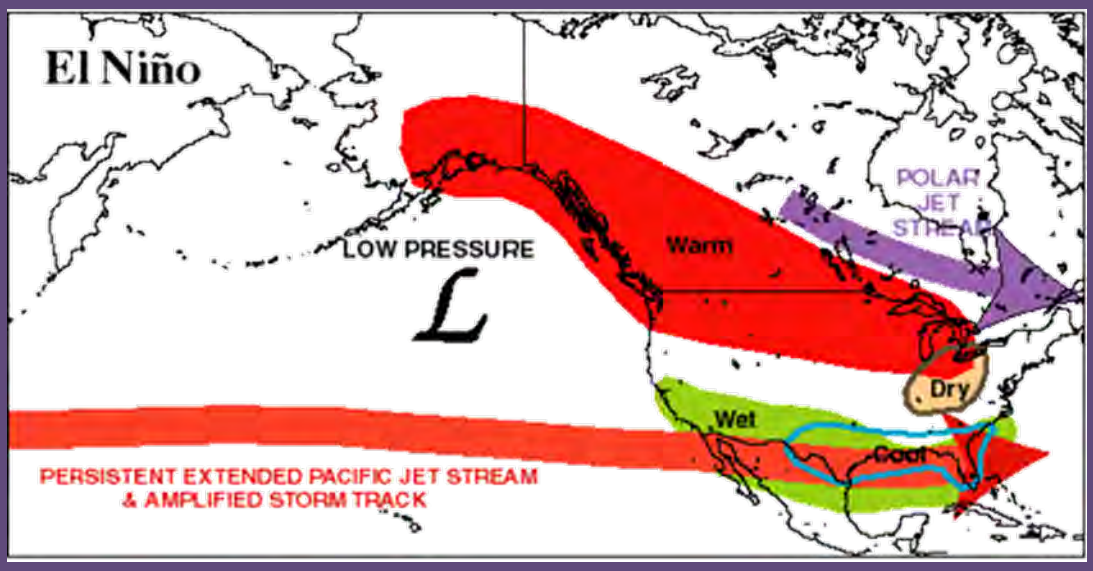


EXECUTIVE DECISION SUPPORT GUIDE:

REGION IX
EL NIÑO EVENT

09 December 2015

FINAL v1.0

FEMA

FINAL DRAFT
FOR OFFICIAL USE ONLY

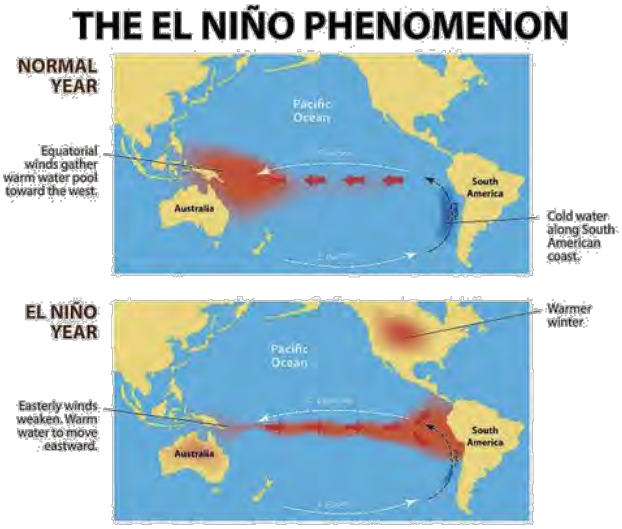
Introduction

The purpose of this Guide is to provide Region IX senior leaders, managers, and operational teams with planning considerations and a suggested series of actionable decision points (DPs) to help guide response and recovery operations before, during and after any impacts from what is expected to be an active winter due to a strong El Niño. This guide seeks to align the DPs to key questions in order to gather critical information leaders need to make informed decisions by determining the threat/hazard level potentially impacting lives, health, safety, property, and critical infrastructure. These key questions and answers provide Essential Elements of Information (EEI), and are further linked to a network of useful analytical simulation tools and data sources to provide some answers and possible Courses of Action (COA) we seek.

This guide serves as a companion document to the *Region IX El Niño Decision Support Architecture* (DSA) which is a time-phased visual roadmap intended to drive our response and recovery decision making processes.

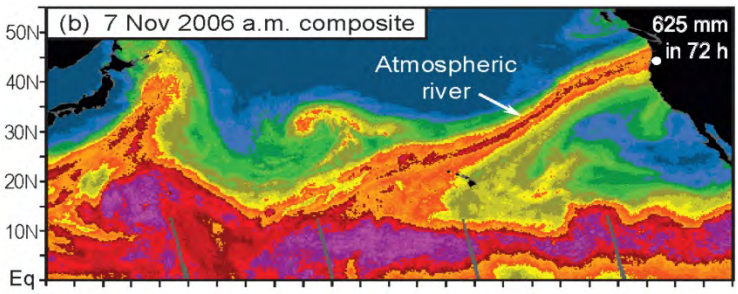
El Niño Definition

El Niño is characterized by unusually warm ocean temperatures in the Equatorial Pacific, as opposed to La Niña, which characterized by unusually cold ocean temperatures in the Equatorial Pacific. El Niño produces consequences for weather around the globe.



Among these consequences are increased rainfall across the southern tier of the US and in Peru, which has caused destructive flooding, and drought in the West Pacific (Hawaii), sometimes associated with devastating brush fires in Australia.

El Niño is often confused with an Atmospheric River (ARs) or a "Pineapple Express." ARs typically occur during the wet months regardless of El Niño or La Niña conditions. ARs are relatively narrow regions in the atmosphere that are responsible for most of the horizontal transport of water vapor outside of the tropics. While ARs come in many shapes and sizes, those that contain the largest amounts of water vapor, the strongest winds, and stall over watersheds vulnerable to flooding, can create extreme rainfall and floods. These events can

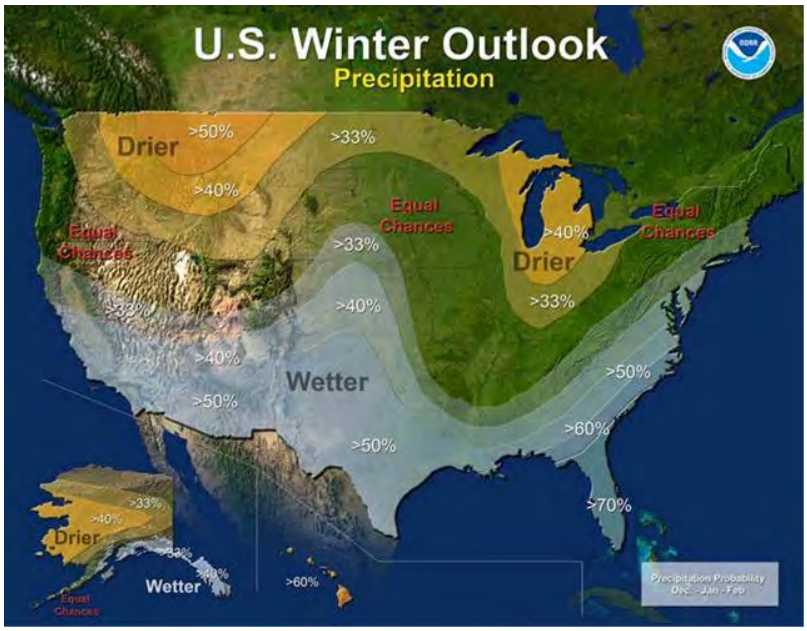


disrupt travel, induce mud slides, and cause catastrophic damage to life and property.

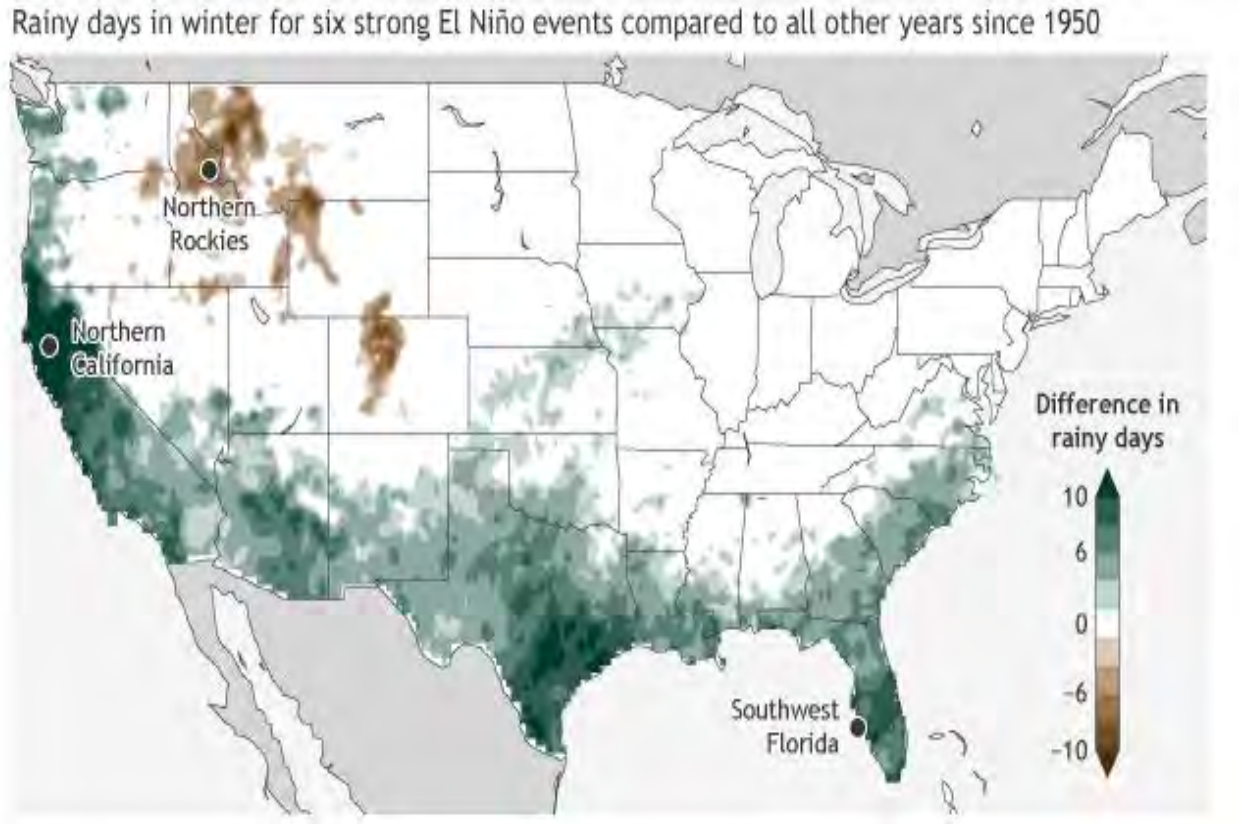
Situation

The National Weather Service (NWS) has forecast a strong El Niño for the winter of 2015-16. As a result, the NOAA Winter Outlook shows probabilities for above normal precipitation over much of CA, AZ, and southern NV, with probabilities for below normal precipitation over HI. There is substantial risk in Northern California (NorCal) due to potential levee failures. These risks are derived from the two strongest El Niño winters, 1997-98 and 1982-83.

In summary, the strongest El Niño years tend to:



- Make California wet, but more so (percent of normal) in the south than the north, and in the late winter than early winter
- Have more wet days, and the wet days tend to be "wetter" than average wet days
- Have higher snow levels, but may receive more snow above this level
- Have significant wave/marine issues at times (high tides, increased coastal volume)
- Be warmer in the Pacific NW with potential for near-to below-normal temperatures far south
- The National Oceanic Atmospheric Administration (NOAA) compiled data from the six strongest El Niño years since 1950. The below graphic outlines their findings:



El Niño vs. La Niña events are broken down in detail in Appendix B – Intelligence.

As a "worst case scenario" NOAA scientists suggested using the **1997-98 season** El Niño (the strongest event on record) as the case on which our planning assumptions are built. According to NOAA, the winter (December 1997- February 1998) was the second warmest and seventh wettest since 1895. In summary, California had the wettest and Nevada had their second wettest February on record. February precipitation records were set at nearly a dozen locations in the east and at least 19 stations in California. Santa Barbara, CA received an incredible monthly total of 21.74 inches, breaking the old record of 17.33 set in 1962 and establishing a record for any month since 1867. Thirty-one inches of rain fell in the Los Angeles area, including almost 14" in February 1998 alone.

Taken from a Western Regional Climate Center report to FEMA, the 1997 portion of the winter was relatively uneventful, although November was somewhat wetter than usual in the northern Sierra. One very powerful and significant storm affected southern California around December 6th, bringing 8-11" in one day to the mountains north of Los Angeles. This storm later affected desert regions to the east. The Sierra snowpack accumulated more slowly than average in December, then sped up and only reached to near average by the end of January. Along the coast, precipitation accumulated steadily, and the northern California 8-station index (representing the upper Sacramento River, an important water supply region) totaled 18.7" during January, 209 percent of its 30-year average. Farther north, Honeydew reported 35.5".

On February 2nd and 3rd, the first of a month-long succession of dramatic and impressive storms struck, with high winds, intense rain, heavy mountain snows, and high surf. Embedded in the fast flow, storms followed closely and quickly on each other's heels, for most of the remainder of the month, leaving little time for recovery. Nearly all of California was affected.

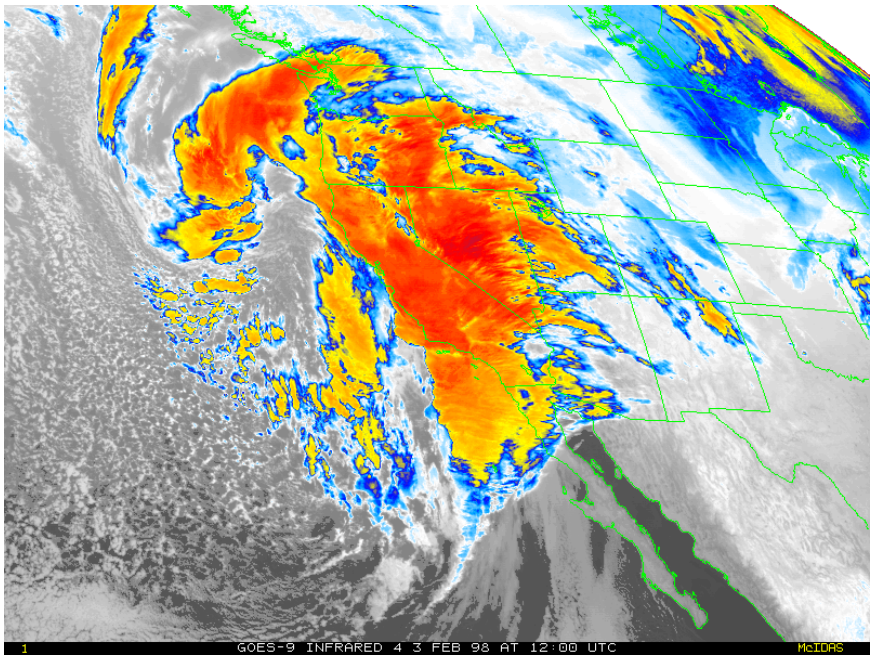
North of Hopland on the Russian River, the constant rains of January and February were spread out well enough that no serious flooding ensued. Eureka reported 13.95", (295 percent, its third wettest February), with February totals in Crescent City of 19.85" (238 percent), Orleans 15.26" (223 percent), and Hayfork 15.36" (312 percent). The Eight-Station Index for February totaled 20.9" (284 percent), and the total from Oct 1 through Mar 2 stood at 57.2" (163 percent for the season-to-date, and 115 percent of the long-term average for the entire year). According to California Department of Water Resources, the state, overall, received 320 percent of average in the month of February alone. The heavy rains exceeded 500 percent in parts of Southern California's coastal counties from Santa Barbara to San Diego.

The rains were not only heavy but persistent. Three California locations indicate persistent inclement weather days in 1998:

Days of Rain		
Location	**January**	**February**
Eureka	26	26
San Francisco	24	22
Blue Canyon	21	25

The lack of any significant letup in rains allowed almost no days for drying. Each period of heavy rain sent more earth sliding to lower elevations at a number of locations in the central and south part of the state. Wet soils above and wave action below eroded oceanfront property the length of the state, with many homes endangered and some lost.

Heavy snows brought the snowpack from near (and even below) average in late January to well above in late February, with snowpack as percent of average for the date in the Tahoe / Carson / Walker area increasing from 82-108 percent of average at month start to 140-152 percent at month end for February. Overall, on March 1 in the Sierra Nevada, snowpack stood at 185 percent of average (north) to 140 percent (central) to 165 percent (south), for a statewide average of 165 percent. Alpine Meadows Ski Area (Tahoe Basin) recorded its snowiest February with 186", just 2 inches shy of the snowiest month on record, and a seasonal accumulation of 396" (annual average is 350"). By late in the month, Mount Shasta Ski Area reported over 200" of snow on the ground.



The vigorous storms caused high winds throughout the month up and down the state. Numerous reports of winds gusting in excess of 60 mph inland, 80 mph along the coast, and 100 mph in the mountains.

The 1998 estimates indicate over $883 million in damages for California. The state also reported 17 storm-related deaths for the winter, and 40 counties were declared federal disaster areas. Clear Lake in northern California reached its highest level since 1909, flooding portions of Lakeport, about 90 miles north of San Francisco. Farm losses alone totaled over $777 million.

FEMA's Data Warehouse provided the following information from DR-1203, disaster period of 02 February 1998 – 30 April 1998. Monetary values below are in 1998 dollars.

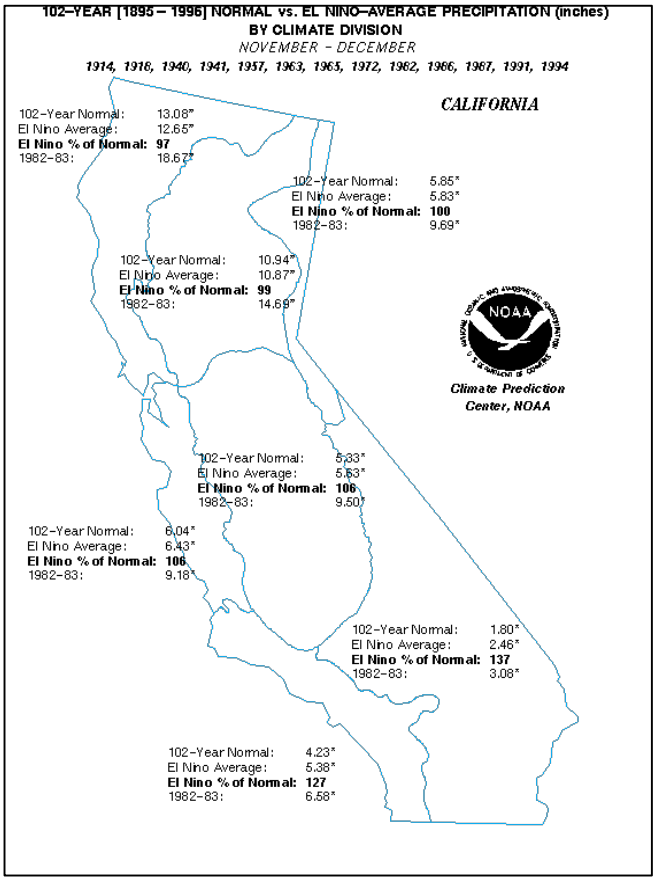
Disaster Number	Region	State	Total Eligible	Federal Share Obligated	Total Obligated	Number of PWs	Number Of Applicants
1203	9	California	$438,719,492.09	$329,810,708.70	$362,295,542.70	10,845	937

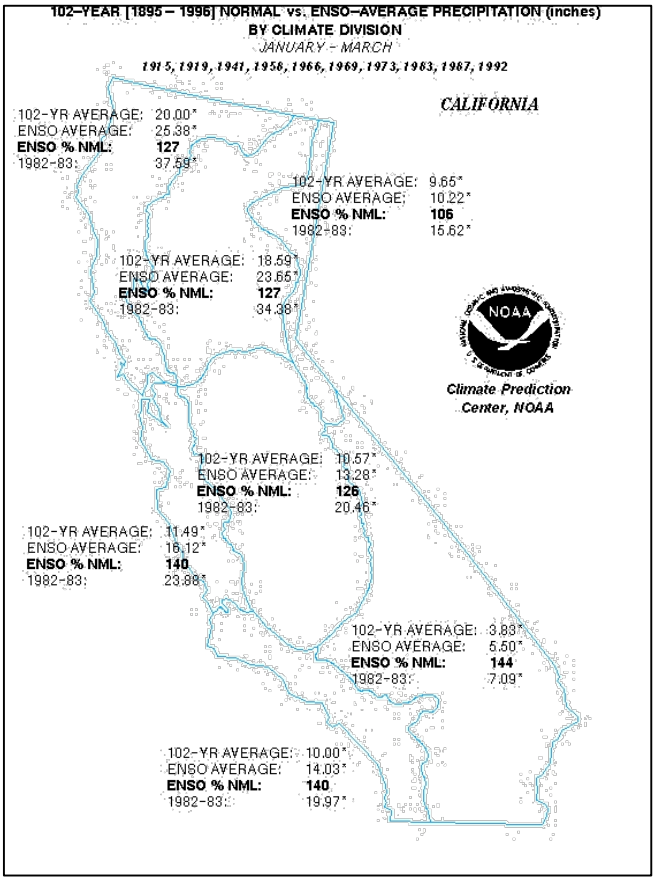
Damage Category Code	Total Eligible	Total Obligated
A - DEBRIS REMOVAL	$61,598,219.57	$51,301,427.31
B - PROTECTIVE MEASURE	$87,994,620.26	$72,125,853.02
C ROADS AND BRIDGES	$112,725,957.10	$95,543,769.93
D - WATER CONTROL FACTS	$47,713,169.69	$39,293,989.15
E - PUBLIC BUILDINGS	$11,141,595.26	$9,340,976.70
F - PUBLIC UTILITIES	$73,646,511.43	$58,155,569.94

Damage Category Code	Total Eligible	Total Obligated
G - OTHER	$43,899,418.78	$36,533,956.65
	$438,719,492.09	**$362,295,542.70**

FEMA Region IX is using the 1982-83 El Niño year as a potential model for the upcoming season. The below side by sides compares precipitation averages to El Nino averages to the 1982-83 season. Historical trends support an increase to California precipitation across the state:

In the **1982-83 El Niño season**, multiple strong storms brought high wind, heavy rain, and heavy snowfall across all of California. This led to direct wind damage, higher tides, immediate flooding to coastal and valley locations, mudslides in coastal mountain areas, record snowfall in





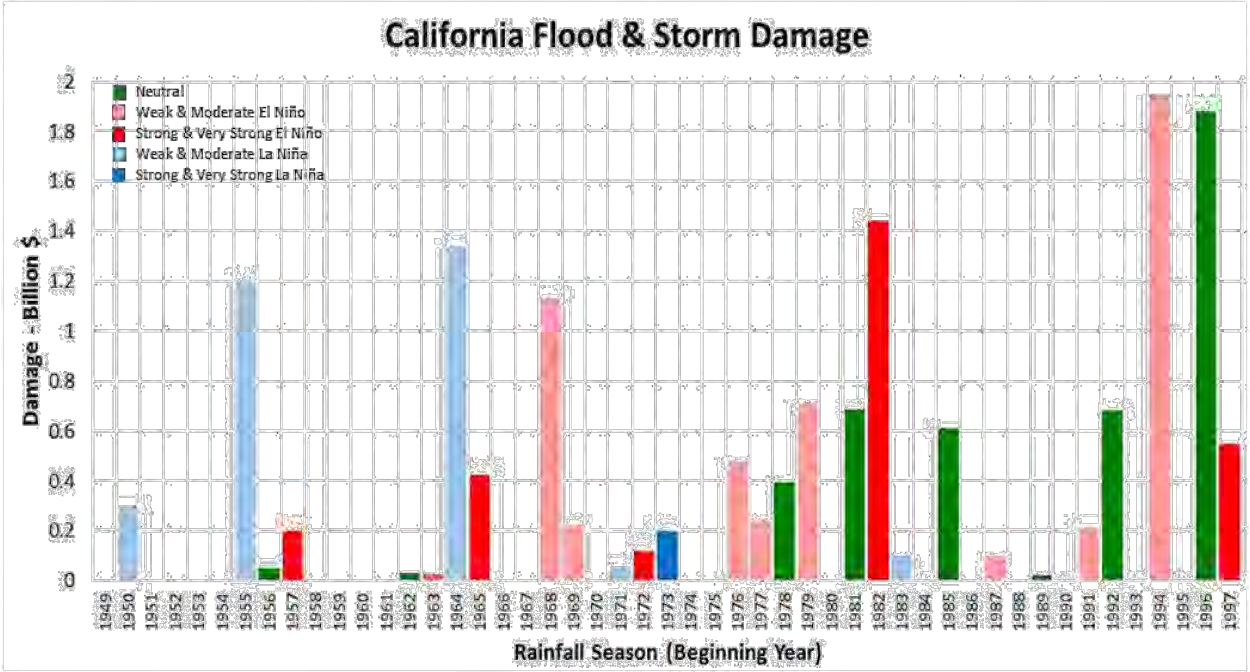
the Sierra Mountains, and resulting spring snowmelt river flooding. In one 36-hour period, 25 inches of rain fell in the Santa Cruz (coastal) mountains while 8.5 feet of snow fell in the Lake Tahoe region. Forty-six counties were disaster-declared.

Long-term Strategic Impact: Lessons learned from this El Niño event were used to lessen the impact of the next El Niño event in 1997-98, including enhanced coordination of reservoir releases.

- Calculated Damages: 36 dead, 481 injured, $1.209 billion economic losses including 6,661 homes and 1,330 businesses damaged or destroyed.
- The storms that followed the 1982 El Niño jammed SoCal freeways, flooded neighborhoods, knocked down trees and power lines, damaged homes, caused mudslides and even generated a tornado in South Los Angeles (L.A.). More than 31 inches fell in L.A. during the 1982-83 rain year.

Anticipated Weather Impacts

History has shown little correlation between the strength of El Niño and the resultant storm damage for CA. In fact, the Golden Gate Weather Service (GGWS) shows that neutral years have caused more flooding than El Niño years. Five of the "strong" El Niño's developed before winters that produced 40 percent more rain than normal in SoCal.



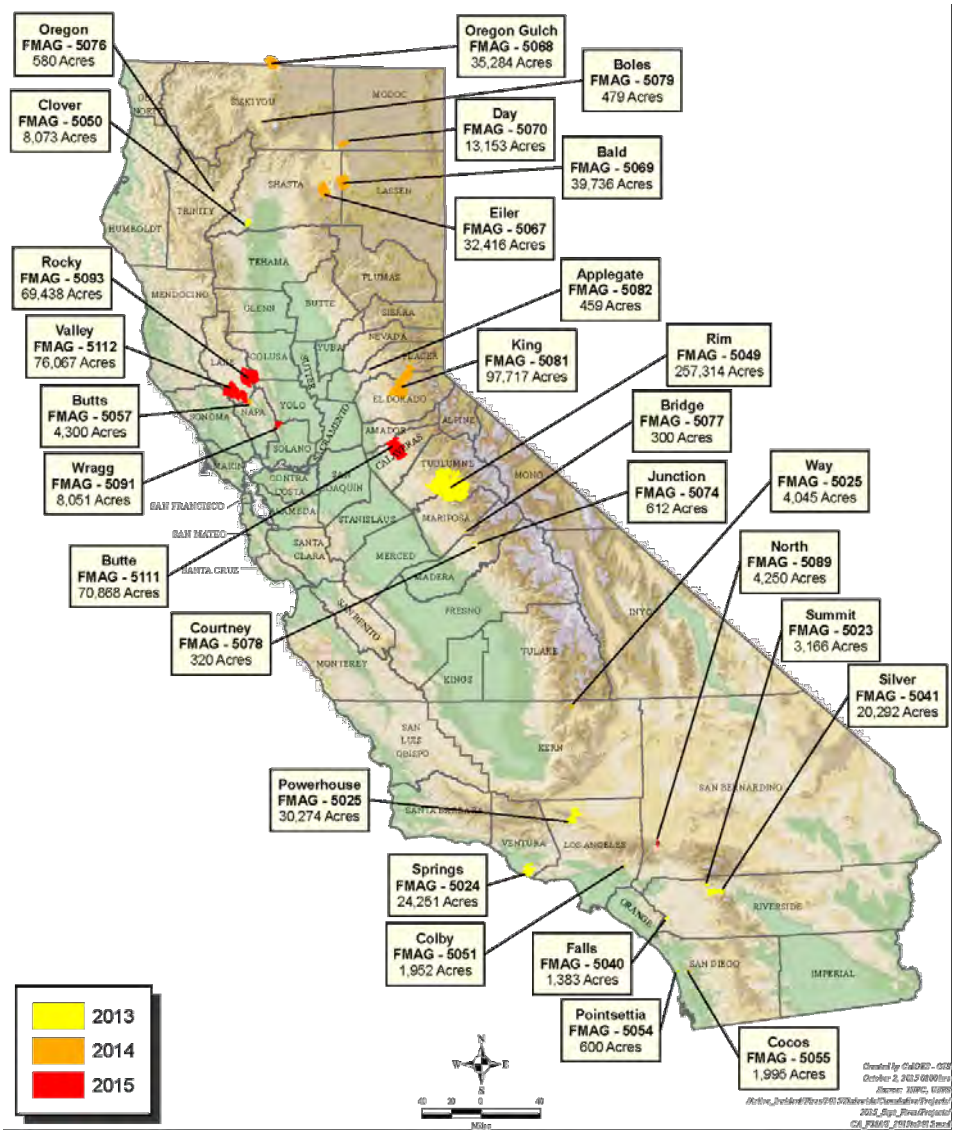
Unlike an earthquake or hurricane, flooding impacts may occur over several days and evolve out of and into contiguous jurisdictions. For example, water may be receding in an area that is just beginning to flood in another area. As such, federal response may be in various stages depending on the impacted jurisdiction's physical location. There is a reduced expectation for main stem river flooding compared to previous El Niño seasons. This is mainly attributed to the drought and current reservoir capacity to store more water. Essentially, this can decrease river flooding as there is a decreased amount of downstream discharge.

Reservoir	October 28, 1997	October 28, 2015
Trinity Lake	59%	21%
Shasta Reservoir	51%	31%
Lake Oroville	58%	29%
Folsom Lake	51%	15%
Don Pedro Reservoir	76%	49%
Exchequer Reservoir	58%	7%
Pine Flat Reservoir	42%	12%
Lake Perris	81%	36%
Millerton Lake	32%	34%
San Luis Reservoir	40%	17%
New Melones	75%	11%

That said, there is increased concern for wide spread overland flooding caused by the drought conditions, especially with the first heavy rains. The lack of soil moisture has caused the soil to harden and act like cement, making it difficult to soak up rains increasing run off. This situation is a large concern for valley and urban areas, called overland flooding. From a meteorology standpoint, this is the greater concern for flooding for this upcoming season.

Weather patterns associated with El Niño may bring heavy winds which can cause widespread power outages, and may simultaneously create additional debris that will clog the streets, storm drains, and tributaries. Airborne Search and Rescue operations may be hindered with high winds and reduced visibility. Additionally, if there is a levee breach or widespread flooding, airborne capabilities may become overwhelmed.

Debris Flows

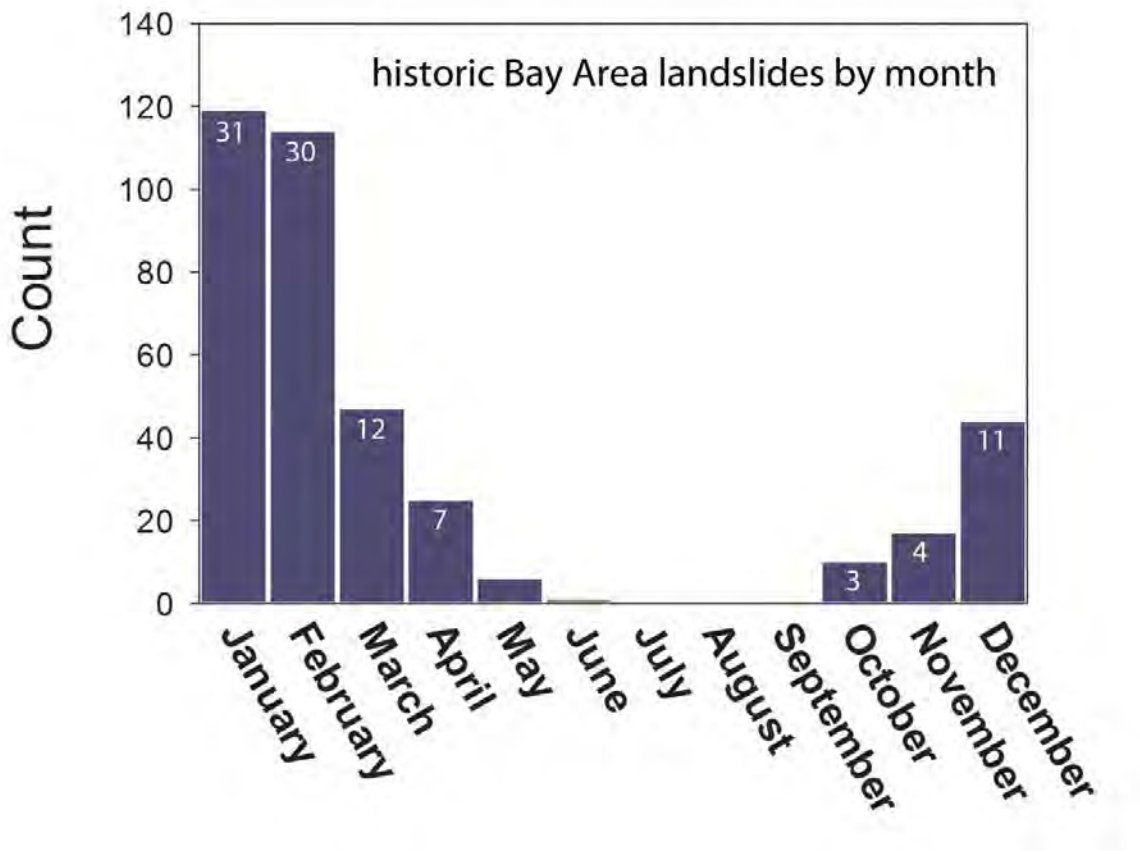


Debris Flows, or Mudslides, and landslides will be common in burn scar areas. Research in recently burned watersheds in the western United States has shown that wildfire changes the runoff response in a watershed and influences debris flow occurrence through the 1) alteration or removal of the vegetation and litter cover, 2) deposition of ash, 2) fire induced changes to soil and rock, and 4) the development of water repellent soil conditions. A 2014 California Department of Water Resources (DWR) and California Geological Survey (CGS) study showed a **16-fold increase in annual debris production in the first year after the watershed had been burned** (approximately 100 percent burn) within Ventura and Los Angeles Counties. The highest recorded was increased by a factor of 25. Some watersheds needed only a 5 percent burn before a significant debris production was seen, others needed as much as 100 percent. Debris production and subsequent flow was experienced in intense storms during both below and above average rainfall years. The report cites seven (7) specific SoCal watersheds that have the potential to generate 10-fold increase or greater above average.

A United States Geological Survey (USGS) report indicates significant landslides occur with **500-760 mm antecedent precipitation, and 8 hours of storm rainfalls at 10-20 mm/hour (about ½ inch an hour)**. This is for wet coastal range, the numbers are lower for inland areas. Current susceptibility models overestimate the abundance of landslides. Without field calibrating the model for each discrete location, it is difficult to forecast location and number of

slides. As such, all modeling and thresholds are based on historical data. In 2011, 4 mm/hour rainfalls triggered small landslides in East Bay for instance, largely because soils were already at 26 percent soil moisture, out of their maximum of 34 percent. In short, it is not enough to know rainfall rates, they provide only coarse guidance. There is a window of susceptibility due to soil moisture. If the storm is longer, it needs less intensity than a very short, intense storm.

The USGS provided the following monthly breakdown:



Sea Level Rise and Coastal Erosion

The 1982/83 El Niño and the 1997/98 El Niño contributed to high rainfall and coastal wave surge in California. There was extensive flooding, landslides, coastal erosion, and damage to coastal structures. The 1977 El Niño, in contrast, had a lower than average rainfall since a high pressure system settled over southern California and diverted storms to the north. One of the other observations from these past events has been that some of the most damaging storms are those that coincide with the highest tides. Storms that peak during high tides are far more likely to cause damage than if the same storm peaked during low tide. According to the California Coastal Commission, some of the highest tides for the 2015/16 winter will occur close to holidays (see table below).

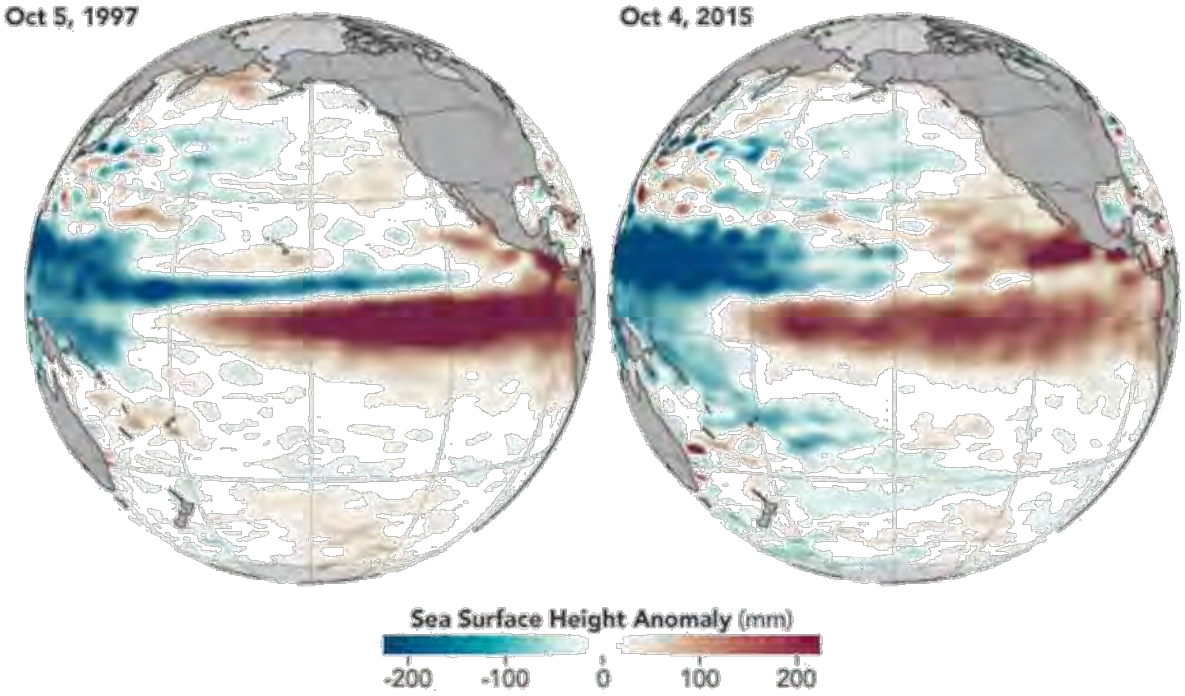
Month	Tides	San Diego	Los Angeles	Santa Barbara	Monterey	San Francisco	Humboldt	Crescent City
November	Tides > 6 ft.	9th-14th 22nd-29th	22nd-28th	23rd-27th	23rd-27th	22nd-28th	1st-2nd 5th-17th 19th-30th	1st-2nd 5th-17th 19th-30th
	Tides > 7 ft.	24th-27th	25th				10th-14th 22nd-29th	10th-14th 21st-29th
	Tides > 8 ft.						24th-27th	24th-27th
December	Tides > 6 ft.	8th-14th 21st-27th	10th-13th 21st-27th	22nd 26th	21st-26th	9th-13th 20th-27th	1st-31st	1st-31st
	Tides > 7 ft.	23rd-25th					8th-14th 19th-28th	8th-14th 9th-28th
	Tides > 8 ft.						22nd-26th	22nd-26th
January	Tides > 6 ft.	7th-12th 19th-25th	8th-11th 20th-24th	10th 21st-22nd	9th-11th 20th-23rd	6th-12th 17th-25th	1st-31st	1st-31st
	Tides > 7 ft.						6th-13th 16th-26th	6th-13th 15th-26th
February	Tides > 6 ft.	6th-10th 19th-22nd	7th-9th		1st-8th	5th-10th 13th-21st	1st-29th	1st-29th
	Tides > 7 ft.						5th-22nd	5th-22nd
March	Tides > 6 ft.	6th-9th	8th			6th-9th 11th-13th	1st-29th	1st-29th
	Tides > 7 ft.						6th-14th	6th-14th
April	Tides > 6 ft.	6th-9th	7th-9th			7th-11th	3rd-14th 18-27th	3rd-13th 19th-27th
	Tides > 7 ft.						7th-11th	6th-11th

Based on average sea level data obtained from the California Climate Change Policy Advisor, scientists indicate California will likely experience rising sea-levels this winter caused by the warmer water seen with El Niño seasons. These elevated water levels will be the base, on top of which additional high water levels will occur due to storms.

Past strong El Niño years produced 6-8 inches of higher sea water levels that persisted for several months, upon which large storms caused additional peak high water levels, which together amounted to as much as 1.5-2.5 feet during storms. During the past two years, surface waters off the West Coast have been unusually warm, which has contributed to higher coastal water levels. These warm ocean waters and other regional processes have caused an increase in water levels of an additional few inches of higher water levels. With El Niño and the blob combined, scientists project that baseline water levels could be elevated 8-11 inches this fall through spring. The *State of California Sea-level Rise Guidance Document* projects a mid-range sea-level rise of approximately one foot by 2050. The unusual conditions that will likely occur this winter appear poised to produce sea levels that reach these mid-century projected levels, but should fade back to more normal levels after the El Niño and the blob fade away.

Greatest damage from water levels occurs when large storms coincide with high tides. El Niño conditions heighten sea levels to even greater levels, and large storms cause high surface waves. 1.5-2.5 feet of elevated water levels were observed from San Francisco to San Diego

during past strong El Niño conditions. High tides occur during new moon and full moon each month. This winter's highest tides ("King Tides") are scheduled to occur in November and December and will require extra precaution because if storms occur during these times, they could be especially damaging, drawing lessons from the winter of 1983. Current sea surface heights are mimicking 1997 levels.



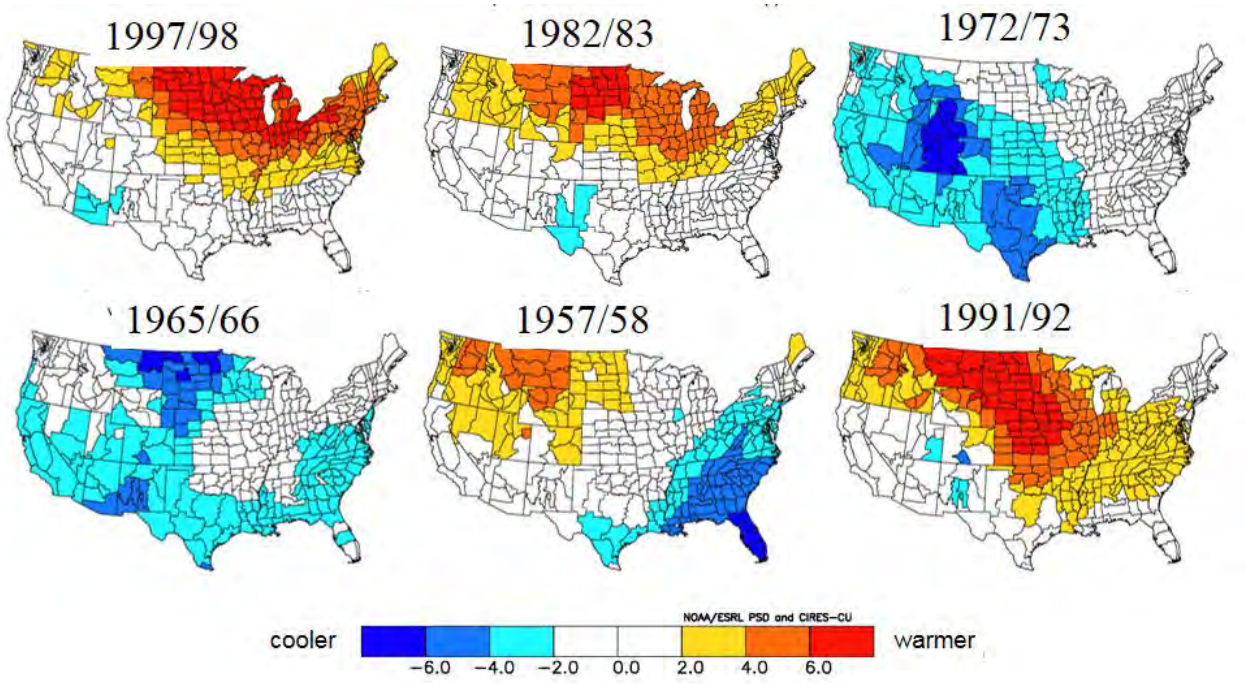
Using one of the sea-level rise visualization tools available[1], 1 foot of elevated water levels place the following at risk:

- 188, 926 people, with 46,842 people with high social vulnerability, including 6,430 Tribal Members
- $39.4 billion in property value (2015 value)
- 473,719 acres of land
- 16 fire and EMS stations and 1 police station
- 17 medical facilities
- 38 schools
- 873 miles of roads
- 9 power plants
- 2 public airports
- 397 EPA listed sites (309 hazardous waste sites)
- 13 wastewater facilities

External Affairs (EA) will interact closely and often with elected officials at all levels and develop appropriate messaging on the dangers. EA may need assistance depending on the amount of jurisdictions.

Temperature Variations

In summary, during the two strongest El Niño seasons, there was little temperature fluctuation



across Region IX. In fact, only two seasons displayed a variations from normal temperatures, cooler in this case.

Public Health

In the event of widespread flooding, Public Health concerns include major threats such as: compromised safety of the water supply and integrity of sewage disposal, food and waterborne illness, electrocution, drowning, primary traumatic injury from high wind speeds, animal bites and insect bites, automobile crashes, carbon monoxide poisoning, and chronic conditions exacerbated by the loss of access to health care, dehydration, heat stress, suicide, drowning and other storm related death/injury, outbreaks of infectious disease from exposure to contaminated flood water, consumption of contaminated drinking water, exposure to contaminates from landslides or flood deposits containing soil pathogens, hazardous material release from chemical facility.

Hospitals without power or potable water will need to be evacuated. Evacuations may be required if hospitals are cut off from supply chains or staff. The same will occur to nursing

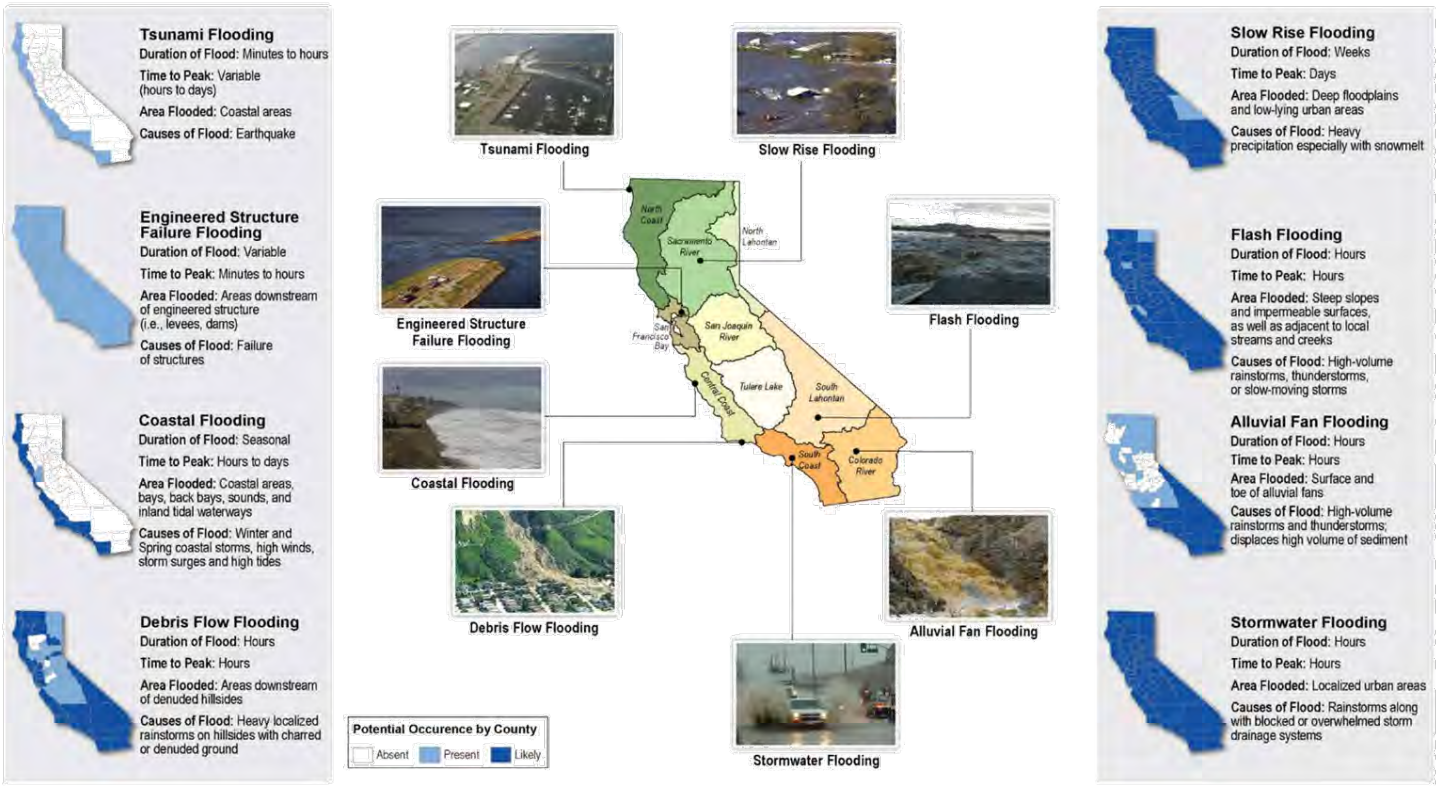
homes and long term care facilities. While all hospitals have generators, some generators may become inundated or their fuel supply contaminated with water, causing additional evacuations.

Recognizing that the biggest health issue faced during Hurricane Katrina was the inability of the displaced populations to manage their chronic diseases; health care will be needed in the shelters as soon as practical to continue medications and ensure medical equipment is available. A capability to check on victims not in shelters (hotels, did not evacuate, etc) is needed to ensure they are getting access to their medications and necessary care.

Geography

California

Overall, one in five Californians lives in an area exposed to flood risk. All 58 counties in California have experienced at least one major flood event in the last 20 years. California is affected by many types of flooding.



Central Valley

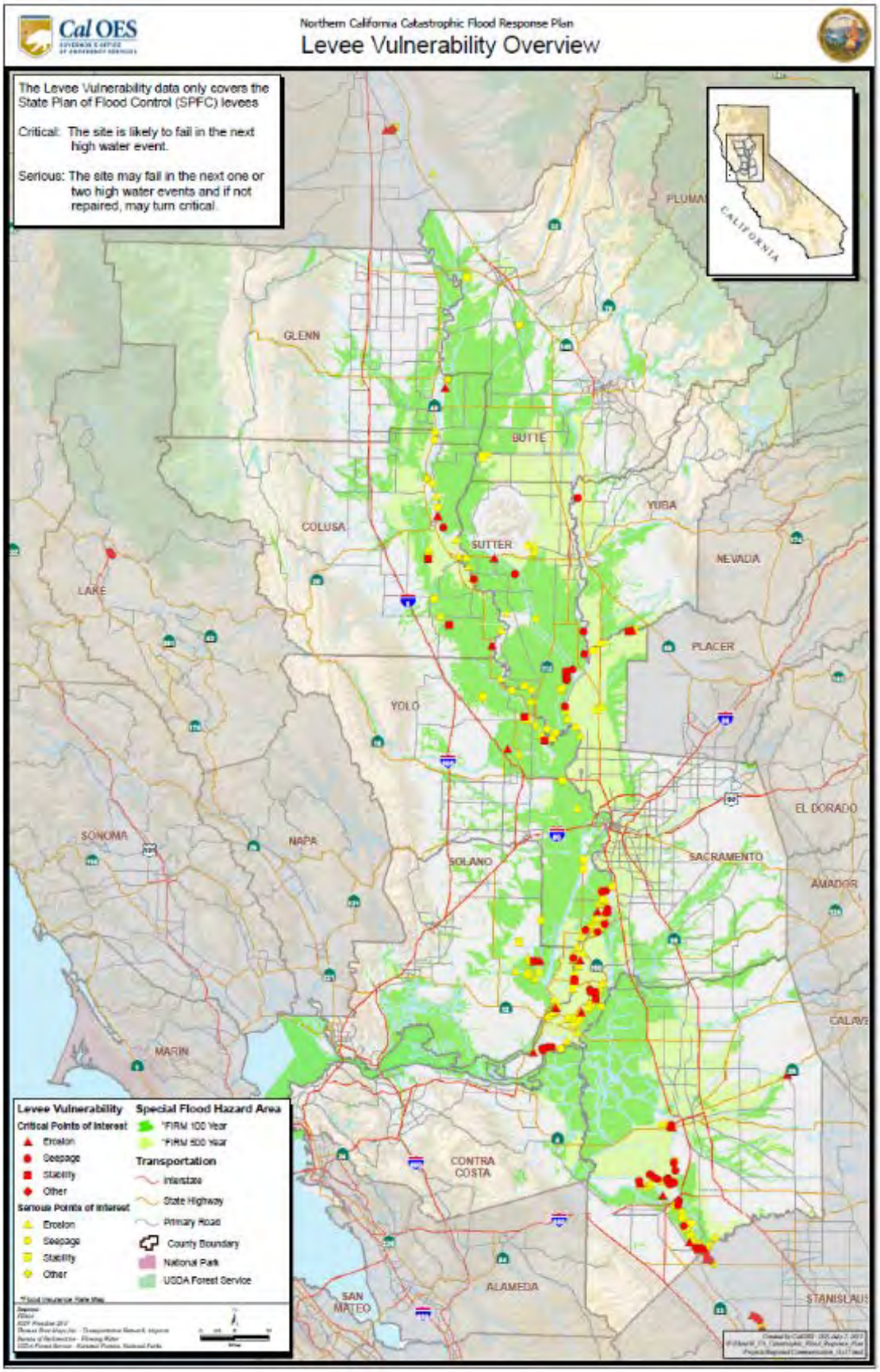
Given its geography, California's Central Valley has the highest potential risk for flooding. The Central Valley has an extensive River System (i.e., the Sacramento River and its tributaries to the north and the San Joaquin River and its tributaries to the south) whose flows are with varying

levels of flood protection provided by a series of levees managed by different reclamation districts and agencies. The primary risk areas are in populated areas mostly notably in Sacramento. As the State capital, and as one of the more populated metropolitan areas in the State, a major flood situation would have significant impact on the economic, cultural, and political life of California. Additionally, a catastrophic levee failure in the Sacramento-San Joaquin Delta would endanger a major source of water supply for 60 percent of California residences and for a portion of the state's agricultural industry.

Three main causes lead to flood conditions along rivers in the Central Valley: (1) any levee breach could potentially cause a flood situation, (2) heavy precipitation could cause rivers to swell and potentially exacerbate levees vulnerabilities, and (3) rapid snow melts could contribute to river flooding.

In January 1997, flood control facilities on the San Joaquin River suffered more than two dozen levee breaks, and extensive sedimentation was observed in the form of new sandbars in the river, as well as widespread deposition of sand and silt in fields and orchards where floodwaters poured through levee breaks. DWR's "Pump Out Program" pumped water out of 80,000 flooded acres. As depicted below, there are approximately 60 DWR levee "critical and serious points of interest." DWR anticipates that the critical points of interest (red) have a high likelihood of failure during the next high water mark.

Note: Only levees within the state program are assessed below. The map does not include private levees which may, or may not be, deemed critical or serious.


Cal OES
Northern California Catastrophic Flood Response Plan
Levee Vulnerability Overview
The Levee Vulnerability data only covers the State Plan of Flood Control (SPFC) levees
Critical: The site is likely to fail in the next high water event.
Serious: The site may fail in the next one or two high water events and if not repaired, may turn critical.
PLUMAS
CALIFORNIA
GLENN
BUTTE
YUBA
COLUSA
SUTTER
NEVADA
LAKE
PLACER
YOLO
EL DORADO
SONOMA
NAPA
SOLANO
SACRAMENTO
AMADOR
MARIN
CONTRA COSTA
ALAMEDA
SAN MATEO
STANISLAUS
Levee Vulnerability
Critical Points of Interest
Erosion
Seepage
Stability
Other
Serious Points of Interest
Erosion
Seepage
Stability
Other
Special Flood Hazard Area
*FIRM 100 Year
*FIRM 500 Year
Transportation
Interstate
State Highway
Primary Road
County Boundary
National Park
USDA Forest Service

Southern California

The forecast shows probabilities for above normal precipitation over much of CA, AZ, and southern NV. SoCal is historically vulnerable to debris flows, landslides, and flooding.

The El Nino event of 1997-1998 had a particularly strong impact on Southern California. NOAA records six incidences of sustained heavy precipitation over multiple days in the region from December 1997 to 1998, with three events causing notable damage. From December 6-8, 1997, 4-8" of rain accumulated across Orange County - the heaviest recorded rainfall in 70 years in the county. The rain brought widespread flooding in Corona and Victor Valley, and a mud flow through Adelanto.

From February 6-9, 1998, 3" of rain fell through much of Southern California. This brought catastrophic and widespread flooding through Newport Beach and Irvine, as well as substantial property damage in southern Orange County. This storm led to evacuations and swift water rescues.

From February 23-24, 1998, Southern California was hit with 2-5" of rain. This storm claimed two lives and caused an estimated $100 million worth of damages. Many communities experienced widespread flooding, power outages, landslides, mud slides, and sink holes. Hundreds of homes were damaged by the storm. This incident damaged many roads, bridges, and railroads, and rural areas faced substantial livestock and crop losses.

Arizona

Being predominantly a desert, Arizona has a lower risk of river flooding seen in other states in the Midwest or east coast. However, because of the natural conditions, Arizona is highly susceptible to flash flooding. Additionally, the Salt and Gila Rivers flow through Phoenix and have historically flooded during heavy rains. The State also may face flood risks from rapid snowmelt in mountainous areas. Historically, strong El Niño episodes have featured an increased frequency of occurrence of above normal precipitation over the state during December-March. For this period totals have averaged about 140 percent of normal precipitation in the northern part of the state up to 180 percent of normal in the southern part of the state. During February through April Arizona tends to be cooler than normal, but only slightly in the western part of the state. El Niño precipitation for key Arizona areas are outlined below:

Phoenix			
	97-98	**82-83**	**Norm**
Nov	0.06	2.50	0.65
Dec	0.83	1.64	0.88
Jan	0.35	0.70	0.91
Feb	2.93	1.17	0.92
Mar	1.31	3.17	0.99
Tot (% of Norm)	**5.48 (126%)**	**9.18 (211%)**	**4.35**

Tucson			
	97-98	**82-83**	**Norm**
Nov	0.49	1.30	0.57
Dec	2.88	1.60	0.93
Jan	0.17	1.70	0.94
Feb	3.20	0.94	0.86
Mar	1.64	1.28	0.73
Tot (% of Norm)	**8.38 (208%)**	**6.82 (170%)**	**4.02**

Flagstaff			
	97-98	**82-83**	**Norm**
Nov	0.80	5.35	1.76
Dec	1.85	3.67	1.87
Jan	1.30	1.61	2.05
Feb	2.15	3.04	2.16
Mar	3.74	4.37	2.12
Tot (% of Norm)	**9.84 (99%)**	**18.04 (181%)**	**9.96**

Nevada

Washoe, Carson City, and Douglas Counties may become flooded depending on storm path and the amount of rain/snow on the east side of the sierras. Outside of a northern storm, the main risks of flood stem from potential rapid snowmelt in mountainous areas (around the Reno, Carson City, and Lake Tahoe areas) and from dam breaches. Northern Nevada routinely experiences high wind (NWS Blizzard Conditions). These high winds create power outages, white out conditions, and road closures (cascading effects).

The table below lists precipitation totals for the July-June period for years with an El Niño episode. Above normal values are shown in green and represent departures from normal of 110 percent or better. Brown values represent below normal values or 90 percent or less than normal. Above normal snowfall values are shown in blue and represent departures from normal of 110 percent or better, while below normal snowfall values are in purple and represent values of 90 percent or less than normal.

Episode	Strength of Episode	Las Vegas July-June Precipitation Total	Las Vegas July-June Seasonal Snowfall Total	Las Vegas November-April Precipitation Total	Las Vegas December-February Precipitation Total
1951-1952	Weak	5.58”	T	3.81”	1.30”
1957-1958	Moderate	6.29”	T	2.62”	1.17”
1963-1964	Weak	3.14”	T	0.45”	0.07”
1965-1966	Moderate	4.15”	T	3.34”	1.07”
1968-1969	Weak	4.54”	T	3.19”	2.60”
1969-1970	Weak	2.17”	T	1.25”	0.87”
1972-1973	Strong	8.43”	0.7”	5.59”	2.32”
1976-1977	Weak	5.06”	0.0”	0.55”	0.24”

1977-1978	Weak	7.24”	0.0”	5.07”	3.57”
1982-1983	Strong	4.45”	0.0”	3.42”	1.47”
1986-1987	Moderate	4.84”	0.6”	3.52”	2.05”
1987-1988	Moderate	5.03”	T	4.36”	1.80”
1991-1992	Moderate	8.77”	0.0”	7.19”	1.99”
1994-1995	Moderate	5.53”	T	4.81”	4.11”
1997-1998	Strong	7.68”	0.0”	4.53”	3.13”
2002-2003	Moderate	4.20”	0.0”	3.04”	2.22”
2004-2005	Weak	10.26”	0.0”	8.86”	6.62”
2006-2007	Weak	1.66”	T	0.42”	0.34”
30 Year Normal	N/A	4.49”	1.0”	2.73”	1.68”
18 Events	All Strengths	5.49”	T	3.67”	2.05”
Average for Moderate and Strong Events	N/A	5.94”	T	4.24”	2.13”

El Niño episodes in Las Vegas tend to have normal to above normal precipitation for the period July-June as well as during the cold season months of November through April and to a lesser extent when just the December through February period was analyzed. La Niña episodes tend to have normal to below normal precipitation during both the July-June season and in the cold season months from November through April. The chances for measurable snow, especially significant measurable snows in excess of 2 inches, is greater than normal during a La Niña episode and less likely than normal during an El Niño episode. During the three strong El Niño events, near normal to below normal temperature have been observed during meteorological winter (December, January and February). Due to the significant increase in average temperature from anthropogenic effects over the past few decades, the effects from other phenomenon, including El Niño and La Niña, are difficult to assess and no definitive conclusions can be made. No correlations were able to be determined for the occurrences of freezes, hard freezes, fog, and tornadoes in both El Niño and La Niña episodes due to limited amount of data. Windier than normal conditions were noted during strong La Nina episodes and overall La Nina episodes tend to be windier than El Niño events.

Reno			
	97-98	**82-83**	**Norm**
Nov	0.86	1.71	0.82
Dec	0.58	1.05	1.03
Jan	1.10	1.72	1.03
Feb	2.59	1.58	1.02
Mar	2.22	1.31	0.76
Tot (% of Norm)	**7.35 (158%)**	**7.37 (158%)**	**4.66**

Tribal Nations

FEMA Region IX has more than 150 tribal nations, many of which may be prone to flooding in the 2015-2016 winter. At present, only 33 of these Tribes have approved Hazard Mitigation Plans. Due to their rural locations, often in the proximity of flood-prone regions, as well as their limited resources, tribal nations are particularly susceptible to flood disasters. The most critical is the Havasupai Tribe, located in the Grand Canyon. In particular, many tribal nations have only one access road in/out of the reservation. This limited infrastructure redundancy makes many tribal nations highly susceptible to being cut off and isolated during floods. There are more than 20 tribal nations between San Francisco, California and Reno, Nevada that are likely to be impacted by a Northern California/Nevada flood event. Given that the Sandy Recovery Improvement Act of 2013 provides tribal governments with the option to be granted their own Presidential disaster declaration, FEMA could face the challenge of responding to multiple Presidential disaster declarations simultaneously. Southern and Northern California similarly have more than 20 tribal nations clustered in a relatively small geographic area. The Navajo nation is particularly worth emphasizing since it has had winter storm disasters over several drought years. Its size, covering three states and three FEMA Regions, relatively large population, multiple chapters, limited infrastructure, make it likely to have a Presidential disaster declaration in an El Nino year.

Critical Considerations

- Predictions associated with El Niño vary greatly and there is no way to be certain about the severity of this winter's storms.
- In 1997, California evacuated 100,000 people and sheltered about 55,000 survivors.
- Twenty percent of Californians currently live in a flood risk area.
- Mass evacuations will be required in the event of flooding. Shelters will be needed in the affected counties and in less affected parts of the state, as well. Damages to water/waste water treatment facilities and power utilities will result in additional evacuations.
- Flooding and landslides will disrupt power, water, transportation and other infrastructure. Pumping facilities for the State Water Project and the Central Valley Project are located in the Central Valley. These facilities provide vital water supplies for more than 25 million Californians and millions of acres of farmland.
- The Sacramento-San Joaquin Delta is particularly vulnerable to levee failures due to its location, aging infrastructure, low elevation, and subsidence. The Natomas Area in Sacramento is particularly high-risk, as are Yuba City and Marysville.
- This scenario could affect the Hetch Hetchy system and the East Bay Municipal Utilities District (EBMUD) water supply system (Mokelumne Aqueduct), supplying water to more than four million people.

- Flooding impact agricultural and farm-related businesses, causing economic damages.
- Burn areas will experience severe debris flow and mudslides stressing the existing fire recovery process and survivors.
- Flooding and landslides will disrupt surface transportation networks. Ports, major highways, and railroads will be affected. Heavy rainfall, flooding, and snow, and landslides will affect roads going into the Sierras and limit evacuations to the east.
- Observations from seasons indicate the most damaging storms are those that coincide with the highest tides. These events are far more likely to cause damage than occurring during low tides. This in turn will threaten shoreline properties and coastal erosion.

Planning Assumptions

- There will be El Niño conditions this winter (current NOAA projections are 95 percent).
- Landslides and debris flows will be widespread in recently burned areas. There will be abundant shallow landslides with heavy rains in areas outside of burn scars.
- Precipitation in California will fall more as rain, leading to less water stored in the snow pack. This does little to alleviate the drought, especially with an increase to southern storm tracks.
- Migration of warm water from the western Pacific to the eastern Pacific, along the coasts of South America, Central America, and California will affect fisheries and cause a persistent elevation of sea level, up to one (1) foot in many areas.
- There will be a higher percentage of southern storm tracks that often bring more rainfall to Southern California compared to northern storm tracks.
- There will be credible early warning of El Niño event that will allow us full execution of this plan across the full spectrum from Phase 1a (Normal Operations) thru Phase 2c (Sustained Response) and into Phase 3 (Recovery).
- There is a Presidential Declaration in phase 1c through 2b.
- Increase in tourism and traveling from late November through January. People's focus is typically towards family and holidays vice property protection.

Concept of Operations

Initial response actions (Phases 1b and 1c) are prompted by the setting of *Significant River Flood Outlook* categories and/or the California Department of Water Resources' (CaDWR) levee warning stages, and involve the activation of operations centers, an assessment of the situation and the development of a response plan. When assessments indicate an increase in the flood

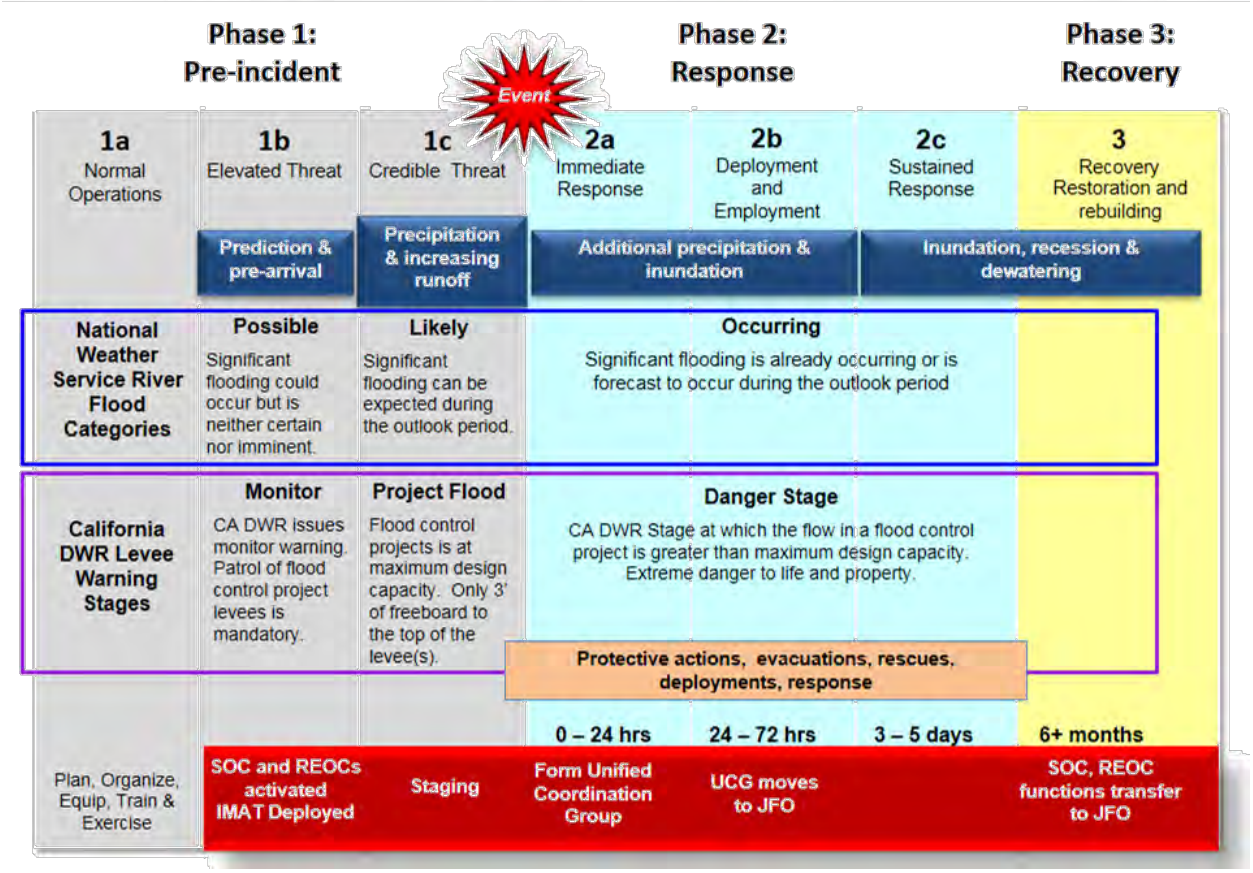
threat, organizations take action to ensure that capability is matched to anticipated need. Additionally, a discrete state request for assistance outside of these aforementioned conditions may prompt federal activity.

Structured and periodic assessments of the situation, activation of tailored specialized teams (force packages) and resources, and the daily development of a response strategy is the core of the response concept. When an assessment indicates a significant flood is possible state and federal emergency management teams activate. When assessments indicate an increase in the flood threat, state and federal organizations take action to ensure that capability is matched to the anticipated need.

Initial response actions may be prompted by the setting of *Significant River Flood Outlook* categories and involve the activation of operations centers, an assessment of the situation and potentially, the development of a whole community response plan.

Leveraging National Incident Management System (NIMS), mutual aid and National Guard Capabilities, states meet required and anticipated requirements of Operational Areas and communities. Through the formation of a Unified Coordination Group, the state coordinates federal support as needed to fill anticipated shortfalls in capability.

As required, capabilities are moved to staging areas. Teams and resources are deployed to staging areas on the periphery of the incident. The operation is executed in phases as depicted below.



The Concept of Operations (ConOps) is executed through a five step response process (Regional Response Coordination Staff (RRCS) and Incident Management Assistance Team (IMAT) focused):

Activation–The RRCS activates. IMAT(s) will be directed to the State Operations Center (SOC) or nearby supporting location and/or LNOs to counties as needed.

Assessment–The SOC, RRCS, and IMAT will assess the situation and identify needs.

Planning–The RRCS will develop an initial plan with input from the IMAT and state.

Deployment–Staging teams and resources will deploy to selected facilities.

Execution–The SOC and RRCS will execute the strategy until the Unified Coordination Group (UCG) movement coordination function is operational and the IMAT has assumed control of the incident.

The ConOps is executed based on National Weather Service (NWS) Criteria. El Niño ConOps operational phases are linked to NWS Significant River Flood Outlook categories and the California Department of Water Resources' (CalDWR) levee warning system:

Phase 1b is linked to NWS "**POSSIBLE**": Conditions indicate that significant flooding could occur. Such flooding is neither certain nor imminent.

California DWR's Monitor Stage - patrol of flood control project levees by the responsible levee maintaining agency becomes mandatory.

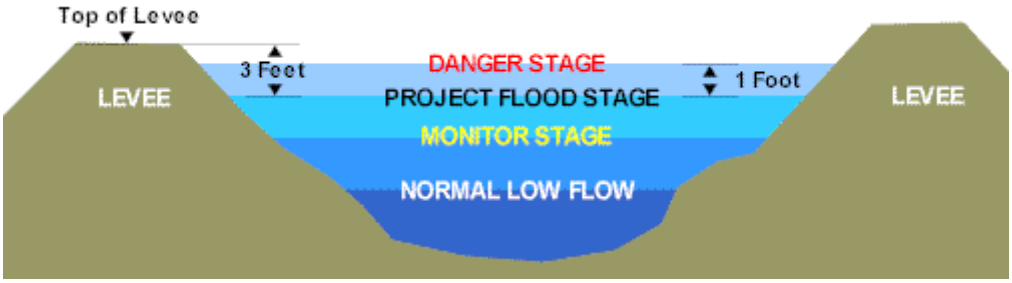
- Under the Regional All Hazards Plan, Phase 1b, the Planning Support Staff (PSS) facilitates and develops the incident Regional Support Plan (RSP). The RSP deploys and supports the IMAT team to the field.
- The IMAT Team(s) are deployed or a National IMAT is requested.

Phase 1c is linked to "**LIKELY**": Hydrometeorological conditions indicate that significant flooding can be expected during the outlook period (5 days).

California DWR's Project Flood Stage - The Stage at which the flow in a flood control project is at maximum design capacity (U.S. Corps of Engineers "Project Flood Plain"). At this level there is a minimum freeboard of 3 feet to the top of levees.

Phase 2 is linked to "**OCCURRING/IMMINENT**": Significant flooding is already occurring or is forecast to occur during the outlook period (5 days).

California DWR's Danger Stage - The Stage at which the flow in a flood control project is greater than maximum design capacity and where there is extreme danger with threat of significant hazard to life and property in the event of levee failure. This is generally 1 foot above project flood stage.



Phase 1: Pre-Incident

Phase 1 (Pre-Incident) is the steady-state condition when there is no threat of flood conditions. Phase 1b (Elevated Threat) and Phase 1c (Credible Threat) occur when the National Weather Service promulgates *Significant River Flood Outlooks*. Operational Areas, Cal OES and FEMA begin to establish emergency management organizations and deploy resources to support communities in the flood threatened area in phase 1b and 1c.

Sub-Phase 1a: Normal Operations

Phase 1a describes normal operations activities in the absence of a flood threat. Phase 1a efforts focus primarily on preparedness and also include planning, training, and exercises. Weather and Flood related actions include analysis, prediction, forecasts and warnings.

- NOAA/NWS analyzes threats associated with incoming storm(s) and notifies FEMA Region IX when the threat indicates an elevated threat of severe flooding. The warning may be in the form of a Flood Outlook Category. CaDWR may issue a warning to CalOES who, in turn, advises FEMA Region IX.
- The FEMA Region IX Watch Center in coordination with the NWS makes assessments of severe weather impacts for FEMA Region IX and notifies Region IX leadership when a weather system poses a severe flood threat.

End-state: The end-state of Phase 1a is situational awareness and readiness to respond to any flood incident. Phase 1a ends with the identification of a weather system or levee breach that poses a severe flood threat to the central valley or the issuance of a Flood Outlook Category.

Sub-Phase 1b: Elevated Threat

Phase 1b occurs when a weather system has been identified that poses a flood threat to Region IX. Phase 1b is associated with the National Weather Service Significant River Flood Outlook category of "POSSIBLE". **Specifically, conditions indicate that significant flooding could occur in populated areas.** Flooding is neither certain nor imminent. This also applies to the Levee "Monitor" Stage.

Activities during this phase include coordinating weather and flood information and activating incident management elements focused on situational awareness and coordinating information. Region IX activates the RRCS and conducts a situational assessment. Based on this assessment, a plan is developed to match regional operations posture (activation level) to the incoming threat.

The RRCC may activate (Level III/Partial Activation) in order to conduct situational awareness or assessment activities in coordination with other operations centers including the NRCC, State EOC, agency operations centers or fusion centers.

The FEMA Region IX IMAT may deploy to the state EOC (SOC). Shared situational awareness is developed between State OES/DEMs, Operational Areas, FEMA Region IX and the corresponding NWS River Forecast Center. If deployed the state-federal team develops a situation assessment and a response plan using the 6-step incident planning process.

- The State-Federal Flood Operations Center (FOC) will officially activate and provide flood forecasts and warnings.
- The FOC Flood Operations and Hydrology Office, the NWS Sacramento Forecast Office, and the Information Services Branch of the Public Affairs Office activate consistent with their internal procedures.
- The Region IX IMAT and Emergency Support Functions (ESFs) support may deploy to the SOC and develop an assessment of the situation in collaboration with the SOC, FOC and in coordination with the RRCS. If deployed, the IMAT develops a response plan using the 6-step incident planning process in coordination with the SOC.

- Determine if additional IMATs are needed for neighboring states/tribes. Deploy/Source additional IMATs as needed.
- If there is a nuclear power plant in the potential impact area, FEMA Radiological Emergency Preparedness (REP) should be placed on stand-by to prepare for a Preliminary Capabilities Assessment and potential for a Disaster Initiated Review. Following a disaster impacting a nuclear power plant, FEMA REP, in conjunction with the Nuclear Regulatory Commission, must make a determination of reasonable assurance before a shutdown plant can return to operation. If the plant continues to operate following the disaster, a determination needs to be made if the plant needs to be shut down until there is reasonable assurance that the health and safety of the public can be protected following an incident at a nuclear power plant.

End-state: The end-state of Phase 1b is when regional or state and federal planning teams have conducted an assessment of the situation and have adjusted the regional posture (activation and deployment level) in accordance with an approved response plan. Phase 1b ends when the threat of an incident has diminished, or when the threat becomes credible.

Sub-Phase 1c: Credible Threat

Phase 1c occurs in response to a specific credible threat of flooding. Phase 1c is associated with the National Weather Service Significant River Flood Outlook category of "LIKELY" for the central valley. Specifically, conditions indicate that significant flooding can be expected during the five day outlook period. Levee "Project Flooding" Stage applies here as well.

Activities during this phase include activation of staging areas and the deployment of capabilities and resources for the whole community. The SOC is activated and the Region IX RRCS is activated. If not already deployed, the IMAT and liaisons deploy to the affected SOC/IOF. The IMAT integrates with its state counterparts if approved by the state. If a disaster is declared prior to severe flooding, the Unified Coordination Group (UCG) will be formed and Incident Action Plan (IAP) process will start.

- If needed, the SOC and IMAT will establish a State-Federal Mass Evacuation Task Force, develop a situation assessment and initiate development of an inclusive support strategy.
- The IMAT establishes a meeting schedule (decision cycle) for the development of an IAP. The IMAT will organize and staff a Geographic Operations Branch and Functional Branches that include Individual Assistance, Infrastructure, Staging Area, Air Operations, Mitigation, and Emergency Communications. FEMA liaison is established at Regional Emergency Operations Centers (REOCs).
- Operational Control of the federal response is shifted to the FCO or IMAT team lead when the team has operational capability and is in direct coordination with state(s).
- FEMA deploys one or more Staging Area Management teams and establishes staging capability.

- External Affairs shares the uptick in operations with elected officials and in response to media inquiries.
- Region IX deploys an LNO to the FOC in coordination with NOAA/NWS.
- NWS deploys a meteorologist to the RRCS

End-state: The desired end-state is the development of the UCG, the positioning of response capabilities and increased operational readiness to respond for the whole community. Phase 1c ends when the flood threat has diminished, or when severe flooding occurs.

Phase 2: Response

Phase 2 begins with the onset of severe inundation and operational impacts to transportation, housing and infrastructure. During Phase 2, capabilities are employed to provide life-saving, life-sustaining, and other support necessary to supplement local, regional, tribal, private sector, disability, nonprofit, nongovernmental, and volunteer agency activities. Between Phase 1c and 2b, a Federal Declaration is received.

Phase 2a

Immediate Response is associated with lifesaving, rescue and evacuation activities. Phase 2a is initiated when the National Weather Service Significant River Flood Outlook category of "OCCURRING**"** when significant flooding is already occurring or is forecast to occur during the outlook period.

Activities during this phase include the coordination of mutual aid and support to the needs of Operational Areas. The Initial Operating Facility (IOF) is activated, staffed and fully functional. The Governor proclaims a disaster and requests a Presidential Disaster Declaration. If not already formed, the UCG will be formed with the SCO and FCO.

Lifesaving actions include evacuations and rescues supported at every SEMS organizational level for the whole community. The state-federal Mass Evacuation Task Force supports evacuation requirements of communities.

An active assessment of the storm and its impact on infrastructure is a critical element of a planning, decision and execution cycle within every SEMS organizational level and at the IOF. Resources and mutual aid is activated and deployed consistent with needs and anticipated needs of jurisdictions and communities.

- The State-Federal Mass Evacuation Task Force will develop an inclusive evacuation support plan based on the needs of Operational Area and communities.
- The joint state/federal UCG is fully functional and supporting the needs of SEMS Regions, Operational Areas and communities. The Operations Section is staffed for response operations. Division Supervisors are deployed to Operational Areas. If needed, the National

IMAT is deployed as required and assumes lead positions in federal Joint Field Office (JFO) sections. Region IX augments and integrates with the National IMAT staff.

- The Infrastructure Branch develops sector specific task forces and assessments of impact in preparation for the development of *Infrastructure Recovery Support* plans. The USCG forms a Port Recovery Task Force and Maritime Transportation System Recovery Unit (MTSRU).
- The FEMA Federal Disaster Recovery Coordinator (FDRC) deploys to the IOF with RSF leads.

End-state: The end-state of Phase 2a is when Operational Areas, REOCs, the SOC and the IOF are coordinating mutual aid and support to rescue, evacuation and infrastructure recovery consistent with SEMS and the National Response Framework (NRF) for the whole community.

Phase 2b

Sub-Phase 2b is associated with employment of teams at the incident site; providing for health and safety needs; sheltering; restoring critical systems such as electrical power, water, and communications; and the establishment of organizational structures for long-term recovery. The transition from an IOF to a JFO facility is initiated.

Activities during this phase include the continued coordination of mutual aid and support to the needs of Operational Areas. The Infrastructure Branch forms sector specific taskforces (transportation, water), makes active assessments of impact and develops support strategies.

The state-federal Mass Evacuation Task Force continues support to evacuation requirements of communities. A state led Disaster Housing Task Force is organized. The recovery organization is formed consistent with the National Disaster Recovery Framework (NDRF).

- Within the Mass Care Branch, the State-Federal Mass Evacuation Task Force will continue to support evacuation and transition to a state led Disaster Housing Task Force.
- The Infrastructure Branch develops and executes sector specific *Infrastructure Recovery Support* plans. The Port Recovery Task Force and Maritime System Recovery Unit (MTSRU) coordinate recovery of the marine transportation system.
- A transition from an IOF to a JFO facility is initiated. Disaster Recovery Centers are established.
- The Infrastructure Branch forms sector specific taskforces (transportation, water), makes active assessments of impact and develops support strategies.
- FEMA REP Staff, if a nuclear power plant and the surrounding area are impacted, form a team with the Nuclear Regulatory Commission and conduct a Disaster Initiated Review for restoration of power at the nuclear power plant, or make a determination if the plant needs to be shut down for safety purposes.

End-state: The end-state of Phase 2b is when required resources (field teams and capabilities) have arrived at the incident site and are integrated into the response. An active assessment of the impact of the storm continues through a planning, decision and execution cycle within every SEMS organizational level.

Phase 2c

Phase 2c is the mature response/recovery phase and includes delivery of Stafford Act programs, the completion of a Recovery Support Strategy by the FDRC, the provision of accessible interim housing solutions, planning of immediate infrastructure repair and restoration, and supporting reestablishment of businesses and NGO's.

Phase 2c establishes stable provision of state and federal response and programmatic support to the needs of the whole community. During Phase 2c, the JFO is established and is the focus of joint state/federal operations.

During Phase 2c, the recovery organization is formed and a mission scoping assessment is developed.

- FEMA operates Disaster Recovery Centers (DRCs) to assist survivors with recovery services.
- The Federal Disaster Recovery Coordinator completes the Recovery Support Strategy.
- The FEMA REP Team has completed their Disaster Initiated Review and finds reasonable assurance that the health and safety of the public can be protected following an incident at a nuclear power plant. This allows the nuclear power plant to restart or resume electrical generation.

End-state: The end-state of Phase 2c is the stable provision of state and federal response and programmatic support to the needs of the community through a JFO. The JFO is at full operational capability is the focus of operational support to Operational Areas and communities.

Phase 2c ends when response activities have set the conditions for recovery. Sheltering has transitioned to temporary housing, enabling the opening of schools. Critical infrastructure is operating using temporary systems and transitioning to repaired systems. Power generation and fuel distribution to essential infrastructure enables communications, water distribution, and basic sanitation.

During Phase 2c, the FDRC works as a deputy to the FCO for matters concerning disaster recovery and ensures recovery activities are well-managed while extended response and short-term recovery activities are ongoing.

Phase 3

Phase 3 is associated development of recovery organizations and the execution of the Recovery Support Strategy. Phase 3 recovery tasks include:

- Develop permanent housing solutions.
- Rebuild infrastructure to meet future whole community inclusive needs.
- Implement economic revitalization strategies.
- Facilitate funding to business rebuilding.
- Follow-up on ongoing counseling, behavioral health, and case management services.
- Reestablish disrupted health care facilities.
- Implement mitigation strategies.

End-state: The end-state of Phase 3 is when actions are taking place that ensure the long term recovery of the affected area. Disaster recovery coordination and collaboration are taking place between the Federal, Tribal, State and local governments, the private sector and voluntary, faith-based, disability, and community organizations. The FDRC partners with and supports the Local Disaster Recovery Manager (LDRM) and the State and/or Tribal Disaster Recovery Coordinator (SDRC/TDRC) to facilitate disaster recovery in the impacted State or Tribal area.

Key Leader Decisions and Decision Points

A Decision Point (or DP) is an event or a point in a time-phased disaster operation where decisions are required based on the analysis process before orders are published and actions are taken. Decision points do not necessarily dictate a senior leader's decisions, DPs only indicate that we have reached a point where a decision is required. Further, DPs indicate when and where the decision should be made to achieve the desired effect on disaster operations. The decisions made by RIX senior leaders are the foundational step in determining the specific information required (EEI) to provide a factual basis for that decision-making. The following table outlines the notional decisions that key leaders would need to make in this El Niño scenario, aligned to a specific time period.

Pre-Disaster Emergency Declarations: A Governor or Tribal Chief Executive may request an emergency declaration in advance or anticipation of the imminent impact of an incident that threatens such destruction as could result in a major disaster. Such requests must meet all of the statutory and regulatory requirements for an emergency declaration request. Requests must demonstrate the existence of critical emergency protective measure needs prior to impact are beyond the capability of the State and affected local governments or Indian tribal government and identify specific unmet emergency needs that can be met through Direct Federal Assistance (DFA). Such DFA may include, but is not limited to, personnel, equipment, supplies, and evacuation assistance. Pre-positioning of assets generally does not require a declaration. Assistance made available under a pre-disaster emergency declaration will typically be Category B (emergency protective measures), limited to DFA. FEMA may require damage assessments and/or verified cost estimates if additional types of assistance are requested.

DP #	Time	Phase	Decision Points
1	**I-30d**	1a	Pre-Designate Federal Coordinating Officer (FCO)
2	**I-30d**	1a	Pre-Designate Federal Disaster Recovery Coordinator (FDRC)
3	**I-72h**	1b	Move to an Enhanced Watch. Evaluate activating IMAT, RRCS, and/or Liaisons to SOCs and Tribes as needed.
4	**I-72h**	1b	Activate Regional Response Coordination Center (RRCS)
5	**I-72h**	1b	Activate/Alert National Urban Search & Rescue (US&R) System
6	**I-72h**	1b	Pre-Stage Logistics Commodities
7	**I-72h**	1b	Deploy Regional Incident Management Assistance Team(s) (R-IMAT)
8	**I-72h**	1c	Pre-Deploy Emergency Support Function (ESF) Resources
9	**I-72h**	1c	Pre-Deploy Initial Department of Defense Support, including Defense Coordinating Element (DCE)
10	**I-72h**	1c	Request Evacuation Support (e.g. Ambulance Contract)
11	**I-48h**	1c	Recommend a Presidential Emergency Declaration (EM)
12	**I-48h**	1c	Mission Assign (MA) National Weather Service (NWS) Meteorologist to the RRCS. Evaluate if an NWS rep is needed with the IMAT.
13	**I-24h**	1c	FEMA REP Staff prepare for Preliminary Capabilities Assessment and Disaster Initiated Review if nuclear power plant and surrounding area are impacted.
14	**I+6h**	2a	Recommend a Presidential Major Disaster Declaration (DR)
15	**I+24h**	2a	Request Follow-on Emergency Support Function (ESF) Resources
16	**I+24h**	2a	Ensure EPA, DHS/CBP, and Department of State is aware of any border or cross border disasters. Issue mission assignments if needed.
17	**I+24h**	2b	Request Follow-on Logistics Commodities or Re-Distribution
18	**I+24h**	2b	Request Follow-on National Assets (Teams)
19	**I+24h**	2b	Request Follow-on Department of Defense (DoD) Resources
20	**I+24h**	2b	Request Additional Waivers, Exemptions, or Policy Decisions (Also: Functional Planning Requirements)
21	**I+24h**	2b	Determine time and location for IA and PA PDAs with the state.
22	**I+24h**	2b	Determine the need to form task forces to address sheltering, housing, feeding and other areas that require additional support.

DP #	Time	Phase	Decision Points
23	**I+24h**	2c	Determine the need for a debris mission and form a debris task force.
24	**I+24h**	2c	FEMA REP Staff complete their DIR for restoration of electrical power at the affected nuclear power plant(s).
25	**I+48h**	2c	Coordinate with DSA Branch Director and OSC on requirements for DSATs to report actionable IA intelligence and to provide registration support and guidance to survivors.
26	**I+48h**	2c	Review initial allocation of the individual and Household Program (IHP) funds and make adjustments as needed.
27	**I+48h**	2c	Determine need for accessible and transitional sheltering program.
28	**I+48h**	2c	Deploy Direct Housing Assessment Team (DHAT)
29	**I+48h**	2c	Transition Incident Support Responsibilities between the NRCS and RRCS
30	**I+72h**	2c	Transition Disaster Recovery Manager (DRM) Authority to the Federal Coordinating Officer (FCO)
31	**I+72h**	2c	Determine DRC numbers, locations, and hours of operations.
32	**I+120h**	2c	Transition Incident Management Responsibilities to the Unified Coordination Group (UCG)
33	***As required***		Deploy Direct Housing Resources / Manufactured Housing Units (MHU)
34	***As required***		Retrograde Logistics Commodities
35	***As required***		Transition Disaster Recovery Manager (DRM) Authority back to the Regional Office
36	***As required***		Transition and Close-Out the Joint Field Office (JFO)
37	***As required***		Determine long term need(s) for housing mission and form a housing task force.

Essential Elements of Information (EEI)

EEIs are essential information requirements needed to help inform decisions. EEIs provide context, inform decision making, and contribute to analysis. EEIs are required to plan and execute an operation and to support timely, logical decisions. As a baseline reference, the EEIs in the following chart are only a starting point.

Specific Information Requirements Aligned to EEIs

The following table provides examples of specific information requirements for each EEI described in the previous table. This list may be refined or expanded based upon the current situation.

EEI	Specific Information Required
WEATHER	
Forecast and Related Information	• Projected path • Estimated rainfall amounts • Arrival timing and duration • Wind speeds and duration • High / Low Tide information and timing • Severe Weather Advisories, Watches, and Warnings
River Forecast & Flooding Information	• Forecast flooding information • Projected duration of flooding • Remote Sensors • Flood / Flow Gauges
Extended Weather	• What is the projected weather post incident • What are the response implications for the whole community
Pre-landfall Information	• Demographics of severe wind/storm area • Pre-landfall remote sensing ("Before" pictures) if major flooding is expected • Boundaries of area evacuated • Estimated percentage of population evacuated pre-landfall • Critical facilities in wind/flood area
Predictive Modeling Impact Projections	• Who is coordinating predictive modeling? • What data inputs are being used? • What programs are being used? • What are the program biases? • Where predictive modeling outputs are available?
Hazard-specific information	• Potential for (or extent of) flooding • Potential for power outages • Potential for Nuclear Power Plant and surrounding area (10 miles) impacted. • Number/estimate of inundated structures potentially requiring Urban Search & Rescue (US&R) • Potential for HAZMAT release • Potential/actual damage/failures • Potential for other hazards involving most at risk populations, etc. • Flash Flood and Debris Flow potential
Historical information	• Have previous storms of similar magnitude affected the area? • What were the results? • What resources were provided by the Federal Government? • What were the major operational problems? • What were other critical issues? • Historical background of flooding in the area.
OPERATIONS	
Status of key personnel	• Who and where is: o IMAT Team Leader o FCO o SCO o C-RRCS o FEMA liaison to State/Tribe o Section Chiefs o Key Support Staff
Status of ESF Activations	• Which ESFs are activated in the o RRCS o IMAT o NRCS
Status of declarations	• Has the Governor/Tribal Leader Requested Assistance and for what and where? • Is the Governor's/Tribal Leader's request a normal or expedited one? • Who is completing the Regional Disaster Summary and Analysis and Recommendation?

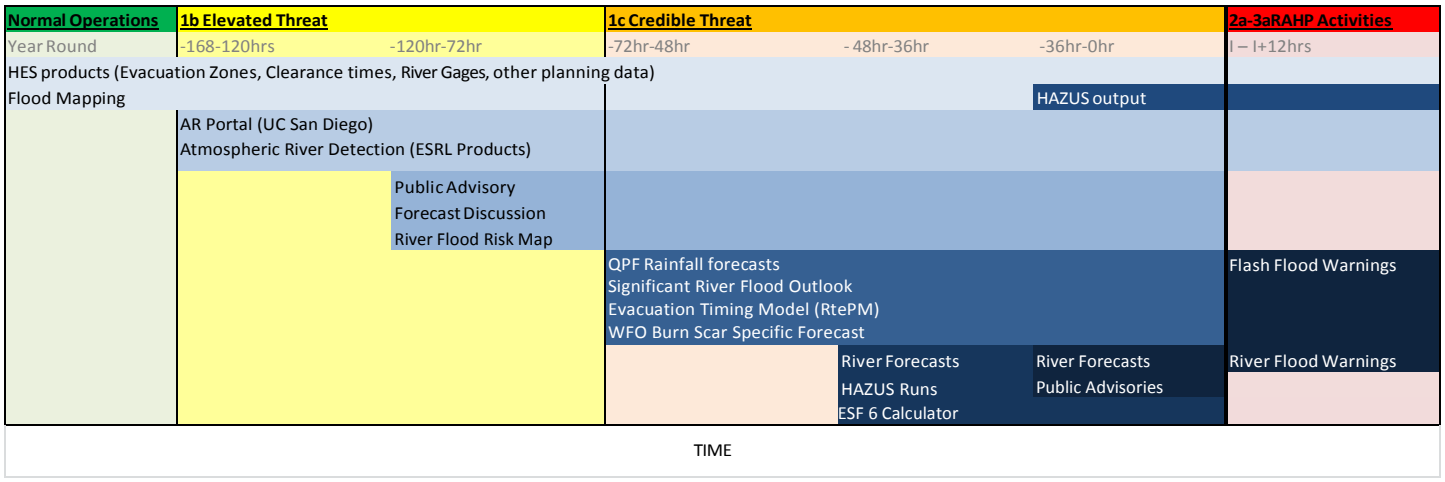
EEI	Specific Information Required
	• Is there a Presidential Declaration and if so what type? • Which jurisdictions are included? • Which types of assistance are authorized? • Are there special cost-share provisions for Direct Federal Assistance? • When are PDAs scheduled? • Which jurisdictions will be assessed, and in what order?
Major issues / activities / Mission Assignments of ESFs/OFAs	• What operations and assessments are agencies conducting under their own authorities? • What mission assignments have been issued? • What is status of Mission Assignments?
Resource shortfalls	• What are the actual or potential resource shortfalls of the affected State or Tribe? • What are the anticipated requirements for Federal resources? • What are potential or actual Federal shortfalls? • What are potential sources for resource shortfalls? • What resources are available and where are they located? • Priorities: water, food, power, medical, heat, communications, at risk populations.
Priorities for Response	• What are the Federal operational priorities? • What are the State/Tribal priorities?
NFIP Impacts	• Are National Flood Insurance Program (NFIP) non-participating communities in the affected area? • Where repair costs are likely to be substantial (exceed 50 percent of structure value)?
Upcoming activities	• What is the schedule of daily meetings and briefings? • What other significant events of activities are planned or scheduled? • VIP visits • Staffing shortfalls
Status of reconnaissance operations	• What Remote Sensing Mission have ESF's undertaken under their own authority? • What remote sensing missions have the State and Local governments undertaken under their own authority? • What remote sensing missions have been already tasked by RST, ERT & EST? • What are the available assets to provide remote sensing data? • What format and when will information be available? • Who is providing interpretation of incoming data? • How will data be shared?
IMPACTS	
Boundaries of Disaster Area	• Geographic locations sustaining damage • Description of extent of damage sustained • Potential for Nuclear Power Plant and surrounding area (10 miles) impacted. • Boundaries of areas evacuated • Estimated percentage of population evacuated • Estimated percentage of population unable to return (people with disabilities/AFN). • *Polygons/files created for development of GIS maps by one GIS unit that can be used by other GIS units. • **All remote sensing imagery or derived maps. • Predictive Modeling Information through HAZUS, USGS, NOAA, NWS, or CaDWR. • Locations where repair costs are likely to be substantial (exceed 50 percent of the structure value) • Disasters that span international borders
Boundaries of secondary disaster areas (inland flooding, power outages, etc)	• Same as above
Jurisdictional Boundaries	• List of jurisdictions (cities, counties, tribes) affected, with maps • Political and congressional jurisdictions affected
Safety Hazards	• Is there a need for personnel protection equipment? • What are the safety hazards in conducting operations? • Was a Disaster Hazard Assessment Plan (DHAP) Form 066-0-0-2 completed by all supervisors and given to Safety?
Status of State/Tribal and local operations	• What are the State/Tribal and local priorities? • What are the major State operations in support of the local jurisdictions? • What support is being received from other States under Emergency Management Assistance Compacts?

EEI	Specific Information Required
Hazardous, toxic and radiological issues	• Are there reported or suspected hazardous material/toxic release incidents? • What follow up actions are planned or underway? • Are there nuclear power plants in the affected areas? • Are there actual or potential radiological incidents? • What follow up actions are planned or underway?
Evacuations	• Maps of evacuated population with shelters and inundation • At risk populations (people with disabilities, transportation disadvantaged, AFN, etc.) • Maps of evacuated areas with usable roads • Are evacuation routes from Nuclear Power Plants impacted?
Debris	• Debris issues on public property • Debris issues on private property • Debris issues on roadways • Debris issues in waterways
EHP	• Types and locations of historic or natural resources affected by the flood.
INFRASTRUCTURE	
Status of critical infrastructure and facilities	• Status of public water supply systems • Status of private water supply systems • Status of public wastewater systems • Status of private septic systems
Status of critical infrastructure and facilities	• Status of electrical power generation and distribution facilities • Status of Nuclear Power Plants and surrounding areas (10 miles) • Number of electrically dependent persons (medical equipment or AFN).
Status of critical infrastructure and facilities	• Status of Acute Medical Care Facilities • Status of Chronic Medical Care Facilities • Status of Home Health Agencies • Status of State, Tribal, and Local Health Departments • Status of State/Tribal/Local EMS Systems • Status of VA Health Care Systems
Status of critical infrastructure and facilities	• Status of local government facilities and systems o Schools. o Public Buildings. o Government Services.
Status of critical infrastructure and facilities	• Status of Water Control Systems (Dams, Levee, Drainage Systems, Storm Water Systems) o Current Status. o Projected Status. o Anticipated breaching and/or overtopping and timeline. o Dam discharge rates and projected impacts. o Reservoir status.
Status of critical infrastructure and facilities	• Status of Natural Gas and fuel pipelines • Estimated percentage of disruption • Estimated time to restore operations
Status of Transportation	• Status of all modal systems, air, sea, land, rail. • Status of major/primary roads. • Status of critical and non-critical bridges. • Status of transcontinental/regional natural gas and fuel pipelines. • Status of evacuation routes. • Status of evacuation routes from Nuclear Power Plants impacted. • Status of public transit and paratransit systems. • Accessibility concerns. • Debris issues. • Anticipated impacts (snow closures, flooding potential, etc).
Status of critical infrastructure and facilities	• Status of local government operations (including police, fire services and EMS)
Status of Commo Systems	• Status of telecommunications service (including Internet) and infrastructure, including towers. • Reliability of cellular. • Service in areas affected. • Potential requirement for radio/satellite communications capability. • Status of emergency broadcast (TV, radio, cable) system and ability to disseminate accessible information to the whole community.
Status of Emergency Operations Centers	• Status of local EOCs. • Status of State EOC. • Status of Agency EOCs.

EEI	Specific Information Required
	• Location and status of Federal facilities established.
Socio-economic/ Political Impacts	• Number and type of businesses affected. • Number of people with disabilities and others with access and functional needs affected
SURVIVORS	
Socio-economic/ Political Impacts	• Number of homes affected. • Potential/estimated population affected. • Number of shelters open/population. • Potential shelter requirements.
Demographics	• Population of impacted areas. • Demographic breakdown of population including income levels. • Number/type of housing units in impacted areas. • Level of insurance coverage. • Population of those with disabilities and others with access and functional needs. • Limited English Proficiency. • Pet numbers and support requirements
Donations/ Voluntary Agency Activities	• Has a Donations Hotline been established or is there a need for the Hotline? • Which Voluntary Agencies are actively involved in operations?
Evacuations	• Total number of evacuated survivors. • Number of evacuate survivors with disabilities and others with access and functional needs. • Number of evacuees not able to return.
Shelters	• Shelter information o Location o Population o Shortfalls • Status of Pet Shelters o Location o Population o Shortfalls • Status of Animal/Zoo Shelters o Location o Population o Shortfalls
Medical Shelters	• Status of Medical Shelters • Shortfalls

Models and Data

Based upon the below graphic, products/tools will be utilized as they become available. The RRCS Situation Awareness Section (SAS) will use the products/tools to enhance Situational Awareness of potential and actual impacts. The SAS will coordinate with the Planning Support Section (PSS) to request the appropriate level of data support (e.g., predictive modeling data, datasets from analytic tools). The data is used to adapt deliberate plans as well as in the development of adaptive plans (Regional Support Plans, Future Plans, etc.).



Time	Data required	Model/Dataset	Data provided	EEI Supported by Model/Dataset
-168 hours	*Identify and characterize potential threat*	Atmospheric River Detection	Atmospheric River detection beginning at 7 days out. Has an analysis for days -6, -5, -4, -3, -2, -24 hours. While not El Niño specific it indicates potential incoming weather patterns. The predictability of AR landfalls along the US West Coast varies depending on the overall atmospheric pattern. A very rough, qualitative guide: **1-4 days**: high confidence in AR (non-)occurrence, moderate-high confidence in location, moderate confidence in intensity **5-7 days**: moderate-high confidence in AR (non-) occurrence, moderate confidence in location, low-moderate confidence in intensity **8-10 days**: moderate confidence in AR (non-) occurrence, moderate confidence in location, low confidence in intensity **11+ days**: AR occurrence, location, and intensity signals sometimes exist, but all are of low confidence http://www.esrl.noaa.gov/psd/psd2/coastal/satres/data/html/ar_detect_gfs.php http://vortex.plymouth.edu/~j_cordeira/ARPortal/Current/products.html	Forecast and Related Information Extended Weather Predictive Modeling Impact Projections Hazard-specific information
-120 hours	*Identify and characterize potential threat*	Advanced Hydrologic Prediction Service Experimental Long-Range River Flood Risk Map	A national scale map with drill down capabilities on AHPS which routinely displays the long range (3-month) risk of minor, moderate and major river flooding locations where probabilistic forecasts are produced.) Sacramento Los Angeles San Diego Phoenix Reno Las Vegas San Francisco	Forecast and Related Information River Forecast & Flooding Information Extended Weather Predictive Modeling Impact Projections Hazard-specific information

Time	Data required	Model/Dataset	Data provided	EEI Supported by Model/Dataset
-72 hours	*Identify and characterize potential threat*	Significant River Flood Outlook	The Significant River Flood Outlook is intended to provide a general outlook for significant river flooding within the CNRFC area of responsibility. It is not intended to depict all small-scale events such as localized flooding and/or flash flooding. http://www.cnrfc.noaa.gov/flood_outlook.php http://www.cnrfc.noaa.gov/ http://www.srh.noaa.gov/rfcexp/main.php?fs=1	Forecast and Related Information River Forecast & Flooding Information Predictive Modeling Impact Projections Hazard-specific information
	Establish evacuation timing; evaluate evacuation scenarios	RtePM	User-run evacuation model to select routes and determine clearance times by region http://rtepm.vmasc.odu.edu/RTEPM/	Evacuations
-48 hours	*Identify and characterize potential threat*	NWS KMLs	Downloadable NWS KMLs to be used for HAZUS or other analysis. Also used for SA displays. http://radar.weather.gov/ridge/kmzgenerator.php	Forecast and Related Information River Forecast & Flooding Information Extended Weather Predictive Modeling Impact Projections Hazard-specific information

Time	Data required	Model/Dataset	Data provided	EEI Supported by Model/Dataset
	Characterize potential impacts to population and infrastructure	HAZUS	Identify most likely impacts based on specific storm forecast (run by GIS / Mitigation)	Predictive Modeling Impact Projections Historical information Priorities for Response NFIP Impacts Boundaries of Disaster Area Boundaries of secondary disaster areas (inland flooding, power outages, etc) EHP Status of critical infrastructure and facilities Status of Transportation Status of Commo Systems Socio-economic/ Political Impacts Demographics
	Establish evacuation timing; evaluate evacuation scenarios	RtePM	Updated user-run evacuation routes and clearance times for specific regions http://rtepm.vmasc.odu.edu/RTEPM/	Evacuations
	Support evacuation and sheltering	ESF #6 Calculator	Population expected to seek shelter (user operated interactive website administered by FEMA) https://www.avma.org/KB/Resources/Statistics/Pages/US-pet-ownership-calculator.aspx	Socio-economic/ Political Impacts Demographics

Time	Data required	Model/Dataset	Data provided	EEI Supported by Model/Dataset
		National Shelter Service (NSS, Red Cross)	Shelters in the affected region; provide as guidance for evacuees (NSS publicly available) http://www.redcross.org/find-help/shelter	Evacuations Shelters
	Food and water requirements and logistics for pre-positioning	ESF #6/7 Calculators	Food and water assets and transportation logistics for pre-staging and delivery (user operated interactive website administered by FEMA – must be behind VPN) FEMA Initial Response Resource Package FEMA DC Readiness Report FEMA Pre-Positioned Sites FEMA Commodities Map	Evacuations Shelters Demographics Socio-economic/ Political Impacts
	Estimate temporary shelter requirements and water commodities requirements	USACE Temporary Housing and Roofing Model	Material requirements for temporary housing and roofing (run by USACE; available via SimSuite for approved users) http://rsc.usace.army.mil/node/190	Shelters Demographics Socio-economic/ Political Impacts EHP
-24 hours	*Updated estimates based on revised forecast*	See all sources for -48 hours	See above	
Phase 2a				
30 min	*River Information*		Recorded River and Reservoir Conditions Menu (800) 952-5530 (toll-free, 24-hour) Main Menu Press 0 to transfer to staff (answering service after hours) Press 4 for recorded river & reservoir conditions menu River & Reservoir Conditions Menu Press 2 for Sacramento Valley and Northern Delta Press 1 for Upper Sacramento River to Tisdale Weir Press 2 for Lower Sacramento River (Fremont Weir to Rio Vista) Feather, Yuba, American Rivers, tributaries, Yolo Bypass Press 3 for San Joaquin River Basin Press 4 for Russian and Napa Rivers Press 5 for North Coastal Rivers Press 6 for Central Coast Rivers Press 7 for Tulare Lake Basin	River Forecast & Flooding Information Hazard-specific information

Time	Data required	Model/Dataset	Data provided	EEI Supported by Model/Dataset
	Estimated impacts to population and infrastructure	CFLA	Estimated impacts to population and infrastructure for similar storms (user accessed layer in FEMA GeoPlatform)	Hazard-specific information Priorities for Response Evacuations Status of critical infrastructure and facilities Socio-economic/ Political Impacts Demographics
	Electrical outages and energy infrastructure impacts	EAGLE-I	Current status of electricity and energy infrastructure damages (real-time data; situational awareness viewer) https://eagle-i.doe.gov/Default.aspx	Status of critical infrastructure and facilities
	Flash-Flood and Debris Flow Potential	USGS / NOAA	Flash-Flood and Debris Flow Early-Warning System. Delivered through the NWS Alerts. Rain rates for 2013-2015 burn areas: http://cdec.water.ca.gov/california_burn_areas.html	Hazard-specific information
4-6 hours	*Estimated impacts to population and infrastructure*	HAZUS	Affected population and infrastructure impacts based on actual storm	See above
By 12 hours	*Debris removal estimates*	USACE Debris Model	Modeled estimates of debris deposited in roadways (run by USACE; available via SimSuite for approved users)	Status of critical infrastructure and facilities Debris
		FEMA Debris Calculator	Expected cost of debris removal in affected regions (run by FEMA)	Status of critical infrastructure and facilities Debris
>24 hours	*Electrical outages and energy infrastructure impacts*	EAGLE-I	Current status of electricity and energy infrastructure damages (real-time data; situational awareness viewer) https://eagle-i.doe.gov/Default.aspx	Status of critical infrastructure and facilities
	Communications damage	FCC DIRS	Communications infrastructure status and function (available online to registered users) https://www.fcc.gov/nors/disaster/Login.cfm	Status of critical infrastructure and facilities

Time	Data required	Model/Dataset	Data provided	EEI Supported by Model/Dataset
	Calculate food and water needs for evacuees and others	ESF #6 and #7 Calculators	Food and water needs and logistics for transport based on number of evacuees and sheltered population (user operated interactive website administered by FEMA) with a present for people with disabilities & functional needs.	See above
	Estimate temporary shelter requirements and water commodities requirements	USACE Temporary Housing and Roofing Model	Temporary housing and roofing requirements based on initial damage reports (run by USACE; available via SimSuite for approved users)	Socio-economic/ Political Impacts Shelters
	Resource status available for deployment	FEMA LSCMS	Amount of supplies ready and available for deployment (run by FEMA) FEMA Initial Response Resource Package FEMA DC Readiness Report	Major issues / activities / Mission Assignments of ESFs/OFAs Resource shortfalls Upcoming activities Donations/ Voluntary Agency Activities
	Personnel deployed (task, type, length)	FEMA Deployment Tracking System	Number of personnel of what type deployed where and for how long (run by FEMA) www.femaresponder.net	Status of key personnel Status of ESF Activations Major issues / activities / Mission Assignments of ESFs/OFAs
>72 hours	*On-going response and recovery needs and activities*	As described above	As described above	See above

Roles and Responsibilities

FEMA's authorities that guide the implementation of this plan are standard operating procedures, doctrine and policy, statutes, and presidential directives. The overarching responsibility of the federal government in flood response is to support local action, in coordination with the state, through the UCG, and provide resources/capabilities when local and state resources and capabilities are inadequate or exhausted to support the whole community.

The Robert T. Stafford Disaster and Emergency Relief Act provides FEMA with the authority to coordinate the federal government response to a major flood. Responsibilities include coordination of life-saving assistance, logistics management and sustainment, mass care, emergency assistance, disaster housing, human services, issuance of Mission Assignments, resource and human capital, incident action planning, financial management, emergency public information and protective action guidance, media and community relations, and congressional and international affairs.

Before a major disaster or emergency declaration, the Stafford Act authorizes deployment and prepositioning of personnel and equipment to reduce immediate threats to life, property, the public, employees, and responder health and safety and to improve the timeliness of its response.

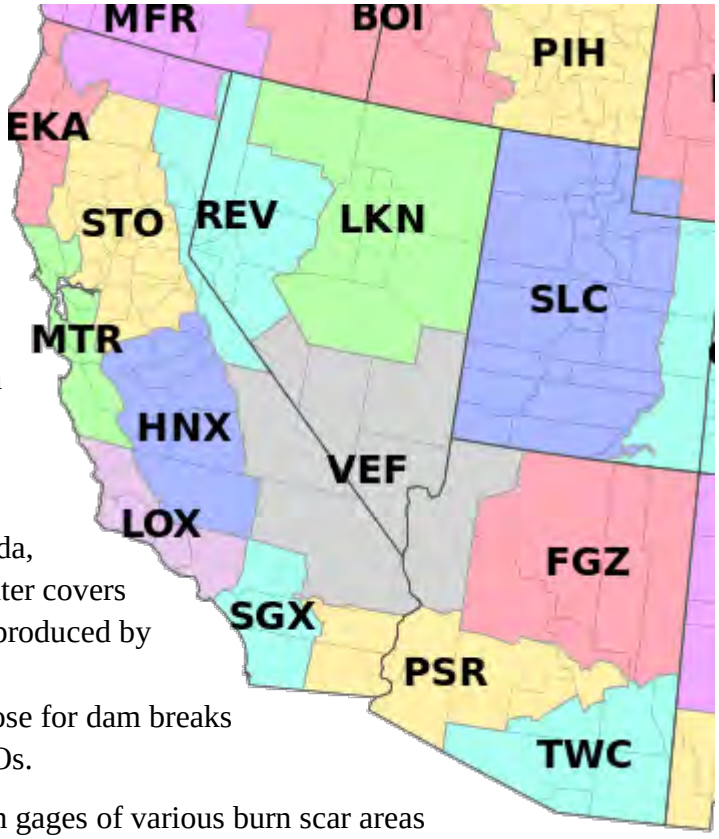
The Stafford Act provides for two types of declarations:

- An Emergency Declaration is more limited in scope than a Major Disaster Declaration, provides fewer Federal programs, and is not normally associated with recovery programs. However, the President may issue an Emergency Declaration *prior to an actual incident* to lessen or avert the threat of a catastrophe.
- A Major Disaster Declaration provides more Federal programs for response and recovery than an Emergency Declaration. Unlike an Emergency Declaration, a Major Disaster Declaration may only be issued after an incident.

FEMA issues work orders to Federal agencies directing completion of a specific tasks through Mission Assignments (MAs). The MA process is derived from the authority primarily outlined in Sections 402, 403, 407 and 502 of the Stafford Act, and it provides that the President may direct any Federal department or agency to provide personnel, equipment, and resources to assist state and local disaster relief efforts. Types of MAs include Direct Federal Assistance, Federal Operations Support, and Technical Assistance. Although rarely exercised, it is important to note that FEMA retains the authority to mission assign agencies on a non-reimbursable basis. MAs may be issued verbally or in response to an action request form (a verbal MA must be followed by a Resource Request Form (010-0-7) within 24 hours). Most forms of Stafford Act assistance require a state cost share.

National Weather Service (NWS) – The mission of the NWS Hydrologic Services Program is to provide river and flood forecasts and warnings for the protection of lives and property and provide hydrologic forecast information. The Weather Forecast Office and the California-

Nevada River Forecast Center are co-located with the State-Federal Flood Operations Center (FOC) in Sacramento. The NWS coordinates directly with the Department of Water Resources (DWR) Division of Flood Management.



The River Forecast Center (RFC) and Weather Forecast Office (WFO) in Sacramento only cover a portion of Region IX. A map of all the WFO's for CONUS Region IX is to the right. Also, the California-Nevada River Forecast Center (RFC) covers most of California and Nevada, but the Colorado Basin River Forecast Center covers Arizona. Forecast river (flood) stages are produced by the RFCs, but the flood and flash flood watches/warnings/advisories (including those for dam breaks and debris flows) are produced by the WFOs.

The NWS WFO's monitor the precipitation gages of various burn scar areas throughout California. When expected precipitation values/rates will exceed agreed upon precipitation thresholds that could possibly generate debris flows NWS will take action. NWS coordinates precipitation thresholds for these areas with local government in advance.

- **2-5 days in advance** – NWS issue a partner email highlighting the approaching storms that might/will exceed the criteria
- **0-2 days in advance** – NWS issues a Flash Flood Watch for Debris Flows - this is our heads up, pay attention conditions are building that if occur could generate debris flows - be prepared to act
- **0 Hours** – NWS issues a Flash Flood Warning - Conditions are imminent or occurring - take action now.

NWS will also be monitoring stage gages for rises in the local creeks for the need for flooding products - Flash Flood or Small Stream Flood Watches/Warnings.

In Phase 1b or 1c, NWS should expect to deploy a meteorologist to the RRCS via Mission Assignment.

US Army Corps of Engineers (USACE) – USACE has authority under PL 84-99, Flood Control and Coastal Emergencies (FCCE) (33 U.S.C. 701n) (69 Stat. 186) for emergency management activities. When the disaster exceeds the capabilities of State and local interests, the USACE may provide assistance under Public Law 84-99 to save human life, prevent immediate

human suffering, or mitigate residential and commercial property damage. Assistance includes: acquisition of flood fight materials; geotechnical evaluation of levees and other flood operations structures; contracts for emergency flood fight and temporary repairs; clearance of drainage channels or blocked structures; technical assistance for development of plans; and upon request, inspection of non-federal dams and flood control projects. The USACE also has jurisdiction over storage capacity seasonally reserved for flood control on most major reservoirs throughout the State.

PL 84-99 allows the Corps of Engineers to supplement State and local entities in flood fighting urban and other non-agricultural areas under certain conditions (Engineering Regulation 500-1-1 provides specific details). All flood fight efforts require a Project Cooperation Agreement (PCA) signed by the Public Sponsor. PL.

Many federal agencies have statutory authorities to provide assistance and coordination under their own authorities. In each case, activities are coordinated by the FCO in the field, primarily through the federal Operations Section Chief.

Department of the Interior, US Bureau of Reclamation - U.S. Bureau of Reclamation manages and operates the Central Valley Project (CVP), one of the world's largest water storage and transport systems. The CVP provides water throughout California for irrigation, water supply, hydropower, recreation, environmental needs, and flood control. United States Bureau of Reclamation– Central Valley Operations (USBR-CVO) may operate from the State-Federal Flood Operations Center.

Environmental Protection Agency - The Environmental Protection Agency (EPA) responds to accidents and terrorist attacks. Response is generally carried out in accordance with the National Oil and Hazardous Substances Pollution Contingency Plan (NCP), 40 CFR Part 300. ESF 10 and includes responsibility to "detect and assess the extent of contamination (including sampling and analysis and environmental monitoring)."

The EPA has plans to respond to and recover from international contamination along the United States and Mexico border. In the event of flooding or river flows into America, Nogales River for example, the EPA monitors and responds to contaminates.

EPA has resources include:

- Federal On-Scene Coordinators (FOSCs) who direct EPA response activities. At the tactical level, on-scene Incident Command or Unified Command, the Federal OSC carries out EPA responsibilities under the National Oil and Hazardous Substance Pollution Contingency Plan (NCP) to coordinate, integrate, and manage overall response efforts;
- EPA Region IX FOSCs are located in Carson City, San Francisco, Los Angeles and Phoenix; and
- EPA FOSCs are supported by specialized teams and contractor resources.

Bureau of Indian Affairs Emergency Management – The Bureau of Indian Affairs (BIA) Emergency Management (EM) is responsible for policy development and program management of Bureau activities concerning disaster preparedness, planning, response and recovery, and continuity of operations; and represents the bureau in coordinating interagency emergency management activities related to tribal affairs. This includes coordinating with and among tribes, other Federal agencies, states, and other jurisdictions to enhance preparedness and resilience of tribal communities for disasters and to support response activities during incidents. Responsibility also includes coordinating across organizational elements of BIA and the Office of the Assistant Secretary.

It is the intent of the BIA EM to be a support and coordination body that can provide additional resource/mission coordination through the Tribal Assistance Coordination Group (TAC-G), when formally requested by a tribal authorized representative. The TAC-G consists of partners from all levels of government (Tribal, Federal, State, county, local, etc.) as well as non-profit aid organizations and the private sector.

Resource Execution Matrix

The Execution Matrix aligns the mobilization (e.g. "activation" or "deployment") of Federal response resources in order to support the incident.

Phase	Core Capability	ESF	Task
1c	Mass Search and Rescue Operations	ESF #1: Transportation	Identify temporary alternative and accessible transportation solutions that can be implemented by others when systems or infrastructure are damaged, unavailable, or overwhelmed.
1c	Infrastructure Systems	ESF #3: Public Works and Engineering	Notify and deploy 249th Engineer Battalion.
1c	Infrastructure Systems	ESF #3: Public Works and Engineering	Notify and deploy Power Planning Restoration Teams.
1c	Infrastructure Systems	ESF #3: Public Works and Engineering	Utilize Emergency Power Facility Assessment Tool database, and coordinate with ESF #1, ESF #8, ESF #10, and ESF#12 to determine if generator need and installation assessment of critical facilities has already been conducted.
1c	Public Health and Medical Services	ESF #8: Public Health and Medical Services	Deploy medical field teams (with the necessary logistical resources) to support search and rescue, triage, treatment, medical surge and transportation (continue through all phases).
1c	Public Health and Medical Services	ESF #8: Public Health and Medical Services	Consider the deployment of Federal Medical Stations.
1c	On-Scene Security and Protection	ESF #13: Public Safety and Security	Activate and deploy ESF #13 Field Support Team (FST) to the affected area(s) upon request.
1c	On-Scene Security and Protection	ESF #13: Public Safety and Security	Deploy DHS Federal Air Marshal Transportation Security Advanced Teams to potentially impacted airports.
1c	Situational Assessment	ESF #5: Information and Planning	Deploy a NWS Meteorologist to the RRCS.
2a	Environmental Response / Health and Safety	ESF 11: Agriculture and Natural Resources	Provide resources capable of removing contaminated and unsafe debris, to include animal carcasses.
2a	Operational Coordination	ESF #4: Firefighting	Provide radio communications systems to support firefighters, law enforcement officers, and incident response operations.
2a	Critical Transportation	ESF #1: Transportation	Provide mass care transportation support to survivors at embarkation, debarkation, and reception centers, evacuation transportation hubs, and post-decontamination areas.
2a	Mass Care Services	ESF #6: Mass Care, Emergency Assistance, Housing and Human Services	Determine the need to form task forces to address sheltering, housing, feeding and other areas that require additional support for inclusive whole community efforts.
2a	Mass Care Services	ESF #6: Mass Care, Emergency Assistance, Housing and Human Services	Provide feeding services at fixed sites, distribution sites, and mobile feeding units which may include hot or shelf-stable meals, infant formula, baby food, snacks, beverages, and food packages, as well as diverse dietary meals (e.g., low sodium, low fat, vegetarian/vegan, and halal kosher).
2a	On-Scene Security and Protection	ESF #13: Public Safety and Security	Activate and deploy ESF #13 FST to the affected area(s) (if not already deployed).
2a	On-Scene Security and Protection	ESF #13: Public Safety and Security	Activate and deploy Federal law enforcement resources for assignment in the affected area(s).
2a	Operational Coordination	ESF #8: Public Health and Medical Services	Transport seriously ill or injured patients and medical needs populations from casualty collection points in the impacted area to designated reception facilities, utilizing the National Disaster Medical System and the National Ambulance Contract, as required.
2a	Fatality Management	ESF #8: Public Health and Medical Services	Deploy Regional Emergency Coordinator (REC(s)) to Health Department) as requested to serve as Federal Senior Public Health and Medical Official or liaison officers to determine situational awareness and potential mission support.

Phase	Core Capability	ESF	Task
2a	Fatality Management	ESF #8: Public Health and Medical Services	Provide bereavement counseling support for affected communities.
2a	Fatality Management	ESF #8: Public Health and Medical Services	Provide fatality management services including victim identification.
2a	Fatality Management	ESF #8: Public Health and Medical Services	Provide temporary mortuary solutions.
2a	On-Scene Security and Protection	ESF #8: Public Health and Medical Services	Coordinate with Communications Unit (ESF#2) to provide additional security to support medical assets and staff.
2a	Environmental Response / Health and Safety	ESF #10: Oil and Hazardous Materials Response	Within 24 hours, provide resources to meet the requirements of an environmental response such as resources to support "assess and monitor" activities to protect responders and the affected population form environmental threats, and to assist in the prevention of and recovery from environmental damage.
2a	Environmental Response / Health and Safety	ESF #10: Oil and Hazardous Materials Response	Deploy the Oil and Hazardous Materials Unit (ESF #10) Primary and Supporting Agencies and the private sector (including responsible parties and contractors) to prioritize, provide coordination, technical assistance, and hazardous materials response.
2a	Operational Coordination	ESF #3: Public Works and Engineering	Provide coordination, response, and technical assistance to support the rapid recovery and reconstitution of critical waterways, channels, and ports.
2a	Operational Coordination	ESF #3: Public Works and Engineering	Provide structural specialist expertise to support inspection of mass care facilities and urban search and rescue operations in coordination with ESF #9.
2a	Environmental Response / Health and Safety	ESF #3: Public Works and Engineering	Deploy debris removal capabilities and coordinate with state partners.
2a	Infrastructure Systems	ESF #3: Public Works and Engineering	Provide staff for rapid CI assessment.
2a	Mass Search and Rescue Operations	ESF #3: Public Works and Engineering	Provide structural engineering expertise in support of search and rescue efforts to ensure the safety of responders and/or survivors.
2a	Mass Search and Rescue Operations	ESF #9: Search and Rescue	Conduct search and rescue operations based on the requirements of state and local authorities.
2b	Operational Coordination	ESF #5: Emergency Management	Deploy continuity support teams to assist in reconstitution of critical government facilities and services.
2b	Natural and Cultural Resources	ESF #11: Agriculture and Natural Resources	Provide incident management teams, such as the National Park Service Museum Emergency Response Team, to assist in NCH resource response actions.
2b	Environmental Response / Health and Safety	ESF #11: Agriculture and Natural Resources	Deploy animal carcass removal resources if carcasses are a result of an animal disease breakout.
2b	Critical Transportation	ESF #3: Public Works and Engineering	Begin the removal of debris from prioritized/critical roadways (goal is within 72 hours following a declaration).
2b	Critical Transportation	ESF #4: Firefighting	In coordination with the Infrastructure Branch, provide debris clearance assistance, personnel, and capabilities.
2b	Environmental Response / Health and Safety	ESF #10: Oil and Hazardous Materials Response	Deploy animal carcass removal contractor resources if animal carcass removal involves oil or HazMat contamination; coordinate with state partners for animal carcass removal priorities.
2b	Environmental Response / Health and Safety	ESF #10: Oil and Hazardous Materials Response	Conduct assessment of oil/hazardous materials releases, which may include sampling and monitoring of air, water, soil, buildings, and other infrastructure.
2b	Fatality Management	ESF #8: Public Health and Medical Services	Deploy the Senior Public Health and Medical Official and/or the REC assigned as liaison to the SOC, to coordinate the HHS assets assigned to fatality management.

Phase	Core Capability	ESF	Task
2b	Fatality Management	ESF #8: Public Health and Medical Services	Deploy the Public Health and Medical Services Unit (ESF #8) personnel appropriate to the response requirements which may include RECs, SMEs, the IRCT to coordinate ESF #8 requests and missions, a Senior Health Official, contractors, and others deemed appropriate to assist and coordinate mortuary services.
2b	Fatality Management	ESF #8: Public Health and Medical Services	Provide a morgue facility, the Disaster Portable Morgue Unit (DPMU), and the necessary personnel, equipment and supplies.
2b	Fatality Management	ESF #8: Public Health and Medical Services	Provide a Family Assistance Center (FAC) team to interview family members for ante mortem identification information and disposition of remains information.
2b	Mass Search and Rescue Operations	ESF #8: Public Health and Medical Services	Respond to medical needs associated with physical and mental health, behavioral health, and substance abuse of both incident survivors and response workers.
2b	On-Scene Security and Protection	ESF #13: Public Safety and Security	Provide trained safety, law enforcement, investigations, and security resources if appropriate authority is provided.
2b	Public Health and Medical Services	ESF #8: Public Health and Medical Services	Deploy Public Health Rapid Deployment Forces, Applied Public Health Teams, Mental Health Teams, and Functional Services Assessment Teams as needed.
2b	Fatality Management	ESF #9: Search and rescue	Identify, map and report fatality locations.
2c	Housing	ESF #6: Mass Care, Emergency Assistance, Housing and Human Services	Build out and ensure operability and accessibility of all identified DRCs (goal is within 48 hours of site acquisition).
2c	Critical Transportation	ESF #3: Public Works and Engineering	Provide technical assistance, clear debris, and restore navigable waterways.
2c	Infrastructure Systems	ESF #3: Public Works and Engineering	Install generators at CI sites as determined by state partners and as rapid needs assessments are completed.
2c	Environmental Response / Health and Safety	ESF #10: Oil and Hazardous Materials Response	Take actions to stabilize the release and prevent the spread of contamination; conduct environmental cleanup actions and decontaminate buildings and structures, and manage wastes.
2c	Fatality Management	ESF #6: Mass Care, Emergency Assistance, Housing and Human Services	Provide public health, behavioral health, and disease information that can be transmitted to members of the general public and responders who are located in or near affected areas, and in languages and formats that are understandable to individuals with limited English proficiency and individuals with disabilities and others with access and functional needs.
2c	Public Health and Medical Services	ESF #8: Public Health and Medical Services	Conduct surveillance of the environment in an affected community to determine whether post-disaster conditions may cause adverse public health effects.
2c	Mass Care and Infrastructure	ESF #6: Mass Care, Emergency Assistance, Housing and Human Services	Coordinate with state to determine time and location to begin PDAs.
2c	Infrastructure Systems	ESF #3: Public Works and Engineering	Coordinate with state to determine time and location to begin PDAs.
2c			Coordinate with DSA Branch Director and OSC on requirements for DSATs to report actionable IA intelligence and to provide registration support and guidance to survivors
2c			Determine DRC numbers, locations and hours of operations
2c			Determine need for transitional sheltering program.
2c			Determine need for housing mission.

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Appendix B – Intelligence

FEMA's liaison to the Storm Prediction Center (SPC) provided the following analysis and information to help frame the situation from a historical perspective. All data was examined under three frames of reference:

1. El Niño Season
2. La Niña Season
3. Neutral Season

Region IX events from 1953 to 2012 indicates a total of 407 weather related declarations:

Region IX	El Niño	La Niña	Neutral	TOTAL	%
DR	79	39	70	188	46%
EM	5	3	10	18	5%
FIRE	68	59	74	201	49%
TOTAL	152	101	154	407	

State and Territory breakdown follows:

Region IX	El Niño	La Niña	Neutral	TOTAL	%
Arizona	20	12	24	56	14%
California	74	54	62	190	47%
Hawaii	9	9	14	32	8%
Nevada	17	21	21	59	15%
American Samoa	4	1	5	10	2%
CNMI	9	0	5	14	3%
FSM	8	2	11	21	5%

Region IX	El Niño	La Niña	Neutral	TOTAL	%
Guam	6	1	4	11	3%
RMI	5	0	3	8	2%
Palau	0	1	5	6	2%
TOTAL	152	101	154	407	

Breakdown by disaster type:

Region IX	El Niño	La Niña	Neutral	TOTAL	%
Flood	27	15	27	69	37%
Hurricane/ Typhoon	27	4	28	59	31%
Severe Storms	1	5	2	8	4%
Fire (DR)	6	5	9	20	11%
Severe Storms (Winter)*	11	8	2	21	11%
Drought	2	1	0	3	2%
Coastal Storm	1	0	1	2	1%
Dam/Levee	2	0	0	2	1%
Freezing	1	1	1	3	2%
Fishing Loss	1	0	0	1	<1%
TOTAL	79	39	70	188	

Breakdown by state (CONUS) and disaster type:

Arizona

Arizona	El Niño	La Niña	Neutral	TOTAL	%
DR	10	7	6	23	41%
EM	1	0	2	3	5%
FIRE	9	5	16	30	54%
TOTAL	20	12	24	56	

Arizona (DR)	El Niño	La Niña	Neutral	TOTAL	%
Fire	1	0	1	2	9%
Flood	6	2	4	12	52%
Severe Storms	0	4	1	5	22%
Severe Storms (Winter)*	3	1	0	4	17%
TOTAL	10	7	6	23	

California

California	El Niño	La Niña	Neutral	TOTAL	%
DR	30	15	20	65	34%
EM	1	3	4	8	4%
FIRE	43	36	38	117	62%
TOTAL	74	54	62	190	

California (DR)	El Niño	La Niña	Neutral	TOTAL	%
Coastal Storm	1	0	0	1	2%
Dam / Levee	2	0	0	2	3%

California (DR)	El Niño	La Niña	Neutral	TOTAL	%
Fire	3	5	7	15	23%
Fishing Loss	1	0	0	1	2%
Flood	16	7	11	34	52%
Freeze	1	1	1	3	5%
Severe Storms (Winter)*	6	2	1	9	14%
TOTAL	30	15	20	65	

Nevada

Nevada	El Niño	La Niña	Neutral	TOTAL	%
DR	3	8	5	16	27%
EM	2	0	2	4	7%
FIRE	12	13	14	39	66%
TOTAL	17	21	21	59	

Nevada (DR)	El Niño	La Niña	Neutral	TOTAL	%
Fire	1	0	0	1	6%
Flood	1	5	4	10	63%
Severe Storms	0	1	0	1	6%
Severe Storms (Winter)*	1	2	1	4	25%
TOTAL	3	8	5	16	