

**2022 - 2023  
Ventura County Grand Jury**



**Final Report**

**Water Availability for Wildfires  
in Ventura County  
June 12, 2023**

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**Water Availability for Wildfires in Ventura County**

**SUMMARY**

In the 2017 Thomas fire and the 2018 Woolsey fire, water shortages hampered firefighters' ability to protect structures. Ventura County frequently experiences conditions of low humidity, high winds and dry brush, conducive to dangerous wildland fires. Ventura County has ninety-six percent of its rural and unincorporated lands classified as very high fire zones.

The 2022-2023 Ventura County Grand Jury conducted an investigation of current protocols and procedures utilized by 15 Ventura County public water purveyors to supply adequate water for wildland fire suppression.

The Grand Jury finds that having written procedures for actions taken by public water purveyors during a Fire Weather Watch, Red Flag Warning, active fire and/or Public Safety Power Shutoffs due to wildfires is a best practice that is lacking in Ventura County.

The Grand Jury finds that most public water purveyors do not have adequate backup power in the event of disruptions due to fire damage or loss of utility power.

The Grand Jury finds that notification to Ventura County public water purveyors of impending Fire Weather Watches and Red Flag Warnings is inconsistent due to out-of-date contact lists at the Ventura County Office of Emergency Services.

The Grand Jury finds that inadequate communication between adjoining Ventura County public water purveyors limits their ability to coordinate available resources, including water transfers.

The Grand Jury finds that the cities of Fillmore, Oxnard and Ventura have not adopted language concerning brush clearance around water infrastructure that is consistent with Ventura County Fire Code.

The Grand Jury recommends that Ventura County water purveyors establish written operational procedures and training to provide for increased water supply during Fire Weather Watch, Red Flag Warning, active fire and Public Safety Power Shutoff events for purposes of firefighting.

The Grand Jury recommends that Ventura County water purveyors have on-site emergency power available for all critical water infrastructure.

The Grand Jury recommends that the Ventura County Office of Emergency Services maintain a current contact list of Ventura County water purveyors, updated at least once a year.

The Grand Jury recommends that Ventura County water purveyors establish common communication protocols with adjoining water purveyors to be able to coordinate needed actions, including water transfers.

The Grand Jury recommends that all Ventura County water purveyors establish a protocol for brush clearance around pumps, water tanks and supported infrastructure in accordance with Ventura County's Fire Code.

## **METHODOLOGY**

The Grand Jury held interviews with Ventura County public water purveyors (hereinafter water purveyors), city and county officials and fire department officials. The Grand Jury also reviewed numerous documents in making its findings.

1. Water purveyors operating procedures, written policies and emergency response plans
2. Water purveyors, city, county and fire department websites
3. State of California Fire Code, State of California Fire Code amendments and State of California related building codes and their amendments
4. County of Ventura Fire Code, County of Ventura Fire Code amendments and County of Ventura related building codes with their amendments
5. Cities Fire Codes, Cities Fire Code amendments, Cities related building codes with their amendments
6. California Division of Drinking Water Regulations
7. California Water Code
8. National Weather Service data base
9. Local National Weather Service definitions
10. Numerous articles regarding climate change
11. State Responsibility Area Fire Hazard Severity Zones
12. Southern California Edison information regarding Public Safety Power Shutoff
13. Numerous historical articles on wildfires
14. Articles on Wildland-Urban Interface
15. After-action reports on the Thomas and Woolsey wildfires
16. US EPA Incident Action Checklists for Water Utilities
17. Public Safety Power Shutoff and Wildfire Information for Public Water Systems
18. US EPA Water Storage Tank time of water in water storage tanks
19. FCC Wireless Priority Service for cell phone priority in emergencies
20. Government Emergency Telecommunications Network for landline phone priority in emergencies
21. CalWARN network

## BACKGROUND

Between 1972 and 2018, California experienced a fivefold increase in annual burned area, with several extremely large and destructive Wildland-Urban Interface (WUI) wildfires. (Ref-01, Att-01) WUI areas are defined as the location where structures and communities “meet or intermingle” with undeveloped wildland. WUI fires occur when fuels are critically dry, weather is warm, humidity is low and sustained high speed winds are prevalent. (Ref-01, Ref-02, Ref-03, Ref-04, Att-02)

In 2017, wildland fires destroyed 6200 homes and killed 44 people in California. Additionally in 2018, 14,000 homes were destroyed killing 85 people, which resulted in an estimated loss of \$15-19 billion. (Ref-03)

Ventura County has experienced numerous large destructive WUI fires between 2003 and 2018, punctuated by the 2017 Thomas Fire and the 2018 Woolsey Fire (Ref-05, Att-03). Ventura Counties wildland fires from 1965 thru 2015 are displayed in Attachment-04. (Ref-06)

Ventura County consists of 1,223,000 acres area that includes approximately 574,000 acres of national forest land (47%), approximately 528,000 acres of rural land and unincorporated land (43%) and approximately 121,000 acres of urban development (10%). (Ref-07) Ninety-six percent of the rural and unincorporated land of Ventura County is classified as a very high fire hazard zone. (Ref-08, Ref-09, Ref-11, Att-05)

The National Weather Service (NWS) provides advisories of impending atmospheric conditions conducive to generation of wildland fires. When these conditions are predicted, a Fire Weather Watch (FWW) advisory is issued between 24 and 72 hours in advance. A Red Flag Warning (RFW) is then issued when these conditions are present. For the last 10 years, the average annual occurrence of FWWs and RFWs combined is 5.5 times per year, each occurrence averaging 3 days in length, for a total of 16.5 days per year. (Ref-02, Ref-10, Att-02, Att-06)

When a FWW or a RFW advisory occurs, some Ventura County water purveyors that store and distribute water are contacted by the Ventura County Office of Emergency Services (OES). Other water purveyors monitor the weather or have direct contact with the NWS to be notified when a FWW or RFW condition occurs or is imminent. However, some Ventura County water purveyors are not advised by either the NWS or OES regarding impending extreme weather conditions. (Ref-11)

When a FWW advisory is issued by the NWS, water purveyors generally initiate procedures preparing their water infrastructure and water storage for potential use in suppression of wildfires. Under RFW conditions, the water purveyors may give priority in storage and distribution of water to firefighting over drinking water quality, raising the quantity of water in storage tanks. (Ref-11). If no wildfire occurs, aging water in storage tanks may degrade in quality, requiring water purveyors to

flush the aging water or give special notice to consumers to take measures to maintain water safe for consumption. (Ref-11, Ref-12, Ref-13)

Generally, water purveyors monitor and regulate the flow of water through wells, pumps, and water storage tanks/reservoirs using Supervisory Control and Data Acquisition (SCADA) computer systems. (Ref-11) These systems depend upon constant reliable electrical power, which can be disrupted by the effects of a wildfire or a Public Safety Power Shutoff (PSPS) by the electrical provider. (Ref-14)

In case of electrical power loss, water purveyors can utilize batteries and generators to provide emergency backup power to their SCADA systems, pumps, wells and other water infrastructure. (Ref-15, Ref-16, Ref-17) This allows the water purveyors to continually provide water for customer consumption and fire suppression after fire damage to electrical systems or temporary shutdown of electrical power. (Ref-11, Ref-14)

In response to FWW and/or RFW, water purveyors generally adjust their water system operations, increasing water flow rates, water storage in tanks and reservoirs for the potential use in wildfire fighting. Water purveyors have a varied range of time to fill their water storage tanks from a few hours to three days if completely dry. The average time is 4 to 8 hours depending on levels maintained during normal operating conditions. Due to the speed wildfires are capable of traveling, some water purveyors start filling water storage tanks during the FWW. (Ref-11, Ref-18, Ref-19)

In general, Ventura County water purveyors lack established common communication protocols to coordinate needed resources among the purveyors, including water transfers. (Ref-11)

In the last 20 years, Ventura County has experienced seven major wildfires. (Ref-04, Att-03) The 2017 Thomas and 2018 Woolsey wildfires challenged water purveyors' ability to keep water sufficiently supplied to firefighters because of a loss of power to water infrastructure, coupled with the speed and size of the wildfires. (Ref-18, Ref-19, Ref-20)

Not all Ventura County water purveyors who are governed by the Ventura County Fire Code keep dry fuels away from pumps and wells, violating Ventura County Ordinance 32 Section 4907.8 The code states: "clearance requirements... shall apply to communication site towers and their support Buildings; required fire protection water supplies including water tanks, water supply pumps and pump houses; and any other utility Structure as required by the Fire Code Official." (Ref-21)

## DISCUSSION (Statements of Fact)

- SF-01.** The United States Environmental Protection Agency (US EPA) and the California State Water Board have published guidelines for water purveyors recommending preparations for wildfires, including increased water storage, reliable power and personnel training. (Ref-22, Ref-23, Ref-24)
- SF-02.** During an RFW, all water purveyors surveyed increase the water level in storage tanks. (Ref-11)
- SF-03.** When a fast-moving wildfire increases in size and water storage tanks do not have adequate supply for firefighting, hydrants may run out of water. (Ref-18, Ref-19, Ref-20)
- SF-04.** During past Ventura County wildfires, firefighters have experienced hydrants that have run dry. (Ref-11, Ref-15, Ref-19, Ref-20)
- SF-05.** For the last ten years, the average number of days that Ventura County has been under Fire Weather Watch (FWW) is 5.5 days, with an average duration of one day. (Ref-10, Att-06)
- SF-06.** For the last ten years, the average number of days that Ventura County has been under Red Flag Warning (RFW) is 11 days, with an average duration of two days. (Ref-10, Att-06)
- SF-07.** One of fifteen water purveyors surveyed have written response procedures for FWW notification and RFW notification. (Ref-11)
- SF-08.** Four of fifteen water purveyors surveyed have written response procedures for an active fire. (Ref-11)
- SF-09.** One of fifteen water purveyors surveyed have written response procedures for PSPS notifications. (Ref-11)
- SF-10.** Two out of fifteen water purveyors surveyed have formal written training procedures to follow when preparing for FWW, RFW, active fire or PSPS scenarios. (Ref-11, Ref-16)
- SF-11.** Five out of fifteen water purveyors surveyed have permanent backup power to all their critical water infrastructure. (Ref-11)
- SF-12.** Five out of fifteen water purveyors surveyed have SCADA systems with emergency battery and backup power. (Ref-11)
- SF-13.** The US EPA's published guidelines for wildfire preparation include establishing shared communication protocols with neighboring utilities. (Ref-22, Ref-24)

- SF-14.** Three of fifteen water purveyors surveyed have a common radio protocol with adjoining water purveyors to coordinate needed actions and rapid water supply transfers. (Ref-11, Ref-17)
- SF-15.** Contact lists used by Ventura County OES, currently supplied by the Association of Water Agencies, are out of date by two years. (Ref-11, Ref-25)
- SF-16.** Six of fifteen water purveyors surveyed have enrolled their employees in the FCC Wireless Priority Service (WPS) for cell phone priority in emergencies. (Ref-26)
- SF-17.** Enrolling in the Government Emergency Telecommunication System (GETS) provides subscribers with priority access to landline telephone networks in emergency situations. (Ref-27)
- SF-18.** Three of fifteen water purveyors surveyed are members of California Water/Wastewater Agency Response Network (CalWARN) which is a mutual aid network that provides emergency resources statewide. (Ref-28)
- SF-19.** The Ventura County Fire Code applies to all local jurisdictions which contract with Ventura County Fire for their fire department service. (Ref-11, Ref-21)
- SF-20.** The cities of Fillmore, Oxnard and Ventura have their own fire departments and have not adopted the Ventura County Fire Code. (Ref-11, Ref-29, Ref-30, Ref-31)
- SF-21.** Two water purveyors surveyed are not subject to Ventura County Fire Code requirements that address brush clearance around water tanks, water supply pumps, pump houses and related infrastructure. (Ref-11, Ref-21)

## FINDINGS

- F-01.** The Grand Jury finds that an adequate supply of water is essential for successful suppression of wildfires. (SF-01, SF-02, SF-03, SF-04)
- F-02.** The Grand Jury finds that the limited number of Fire Weather Watch (FWW) advisories amplifies the importance of establishing written procedures, protocols and training. (SF-01, SF-05, SF-07, SF-10)
- F-03.** The Grand Jury finds that written procedures for actions taken by water purveyors during a Fire Weather Watch event is a best practice that is lacking in Ventura County. (SF-01, SF-05, SF-07, SF-10)
- F-04.** The Grand Jury finds that the limited number of Red Flag Warning (RFW) events amplifies the importance of establishing written procedures, protocols, and training. (SF-01, SF-06, SF-07, SF-10)

- F-05.** The Grand Jury finds that written procedures for actions taken by water purveyors during a Red Flag Warning event is a best practice that is lacking in Ventura County. (SF-01, SF-06, SF-07, SF-10)
- F-06.** The Grand Jury finds that written procedures for actions taken by water purveyors during an active fire event is a best practice that is lacking in Ventura County. (SF-01, SF-08, SF-10)
- F-07.** The Grand Jury finds that written procedures for actions taken by water purveyors during Public Safety Power Shutoff (PSPS) events is a best practice that is lacking in Ventura County. (SF-01, SF-09, SF-10)
- F-08.** The Grand Jury finds that backup power to critical infrastructure is not always available. (SF-01, SF-11)
- F-09.** The Grand Jury finds that SCADA systems are not equipped with backup power in all instances. (SF-01, SF-12)
- F-10.** The Grand Jury finds that inadequate communication between adjoining water purveyors limits the ability to coordinate needed actions such as available water transfers. (SF-13, SF-14)
- F-11.** The Grand Jury finds that notification to water purveyors of FWWs and RFWs is inconsistent due to out-of-date contact lists. (SF-13, SF-15)
- F-12.** The Grand Jury finds that enrolling in GETS and WPS would allow Ventura County water purveyors priority access to landline and cellular telephone networks in emergency situations. (SF-16, SF-17)
- F-13.** The Grand Jury finds that enrolling in CalWARN would allow Ventura County water purveyors access to statewide resources. (SF-18)
- F-14.** The Grand Jury finds that Ventura County Fire Code section 4907.8 regarding brush clearance around water tanks, water supply pumps, pump houses and related infrastructure applies to all rural and unincorporated communities, and all cities except Fillmore, Oxnard and Ventura. (SF-19, SF-20, SF-21)

## RECOMMENDATIONS

- R-01.** The Grand Jury recommends that water purveyors establish written operational procedures and training to provide for increased water supply for fire flow during FWWs, RFWs, active fires and PSPS. (F-01, F-02, F-03, F-04, F-05, F-06, F-07)
- R-02.** The Grand Jury recommends that water purveyors have emergency power on site for all critical water infrastructure including SCADA systems. (F-08, F-09)
- R-03.** The Grand Jury recommends that water purveyors establish common communication protocols with adjoining water purveyors to coordinate needed actions, including water transfers during active fires. (F-10)
- R-04.** The Grand Jury recommends that Ventura County Sheriff's OES develop a current contact list of water purveyors, updated at least once a year. (F-11)
- R-05.** The Grand Jury recommends that water purveyors enroll their employees in the FCC Wireless Priority Service (WPS) providing cell phone priority in emergencies. (F-12)
- R-06.** The Grand Jury recommends that water purveyors enroll in the Government Emergency Telecommunications System (GETS) providing landline phone priority in emergencies. (F-12)
- R-07.** The Grand Jury recommends that all water purveyors enroll in CalWARN, a network of water and wastewater agencies that can provide emergency resources. (F-13)
- R-08.** The Grand Jury recommends that all water purveyors provide brush clearance around water tanks, water supply pumps, pump houses and related infrastructure. (F-14)
- R-09.** The Grand Jury recommends that Ventura City Fire Department, Oxnard Fire Department and Fillmore Fire Department adopt the Ventura County standard for brush clearance around water tanks, water supply pumps, pump houses and related infrastructure. (F-14)

## RESPONSES

Responses required from:

### **The following elected officer within 60 days:**

Ventura County Sheriff (F-11, R-04)

### **The following governing bodies within 90 days:**

Camrosa Water District, Board of Directors (F-01, F-02, F-03, F-04, F-05, F-06, F-07, F-08, F-09, F-10, F-12, F-13, F-14, R-01, R-02, R-03, R-05, R-06, R-07, R-08)

Casitas Municipal Water District, Board of Directors (F-01, F-02, F-03, F-04, F-05, F-06, F-07, F-08, F-09, F-10, F-12, F-13, F-14, R-01, R-02, R-03, R-05, R-06, R-07, R-08)

City of Camarillo, City Council (F-01, F-02, F-03, F-04, F-05, F-06, F-07, F-08, F-09, F-10, F-12, F-13, F-14, R-01, R-02, R-03, R-05, R-06, R-07, R-08)

City of Fillmore, City Council (F-01, F-02, F-03, F-04, F-05, F-06, F-07, F-08, F-09, F-10, F-12, F-13, F-14, R-01, R-02, R-03, R-05, R-06, R-07, R-08, R-09)

City of Oxnard, City Council (F-14, R-09)

City of Santa Paula, City Council (F-01, F-02, F-03, F-04, F-05, F-06, F-07, F-08, F-09, F-10, F-12, F-13, F-14, R-01, R-02, R-03, R-05, R-06, R-07, R-08)

City of Simi Valley, City Council (F-01, F-02, F-03, F-04, F-05, F-06, F-07, F-08, F-09, F-10, F-12, F-13, F-14, R-01, R-02, R-03, R-05, R-06, R-07, R-08)

City of Thousand Oaks, City Council (F-01, F-02, F-03, F-04, F-05, F-06, F-07, F-08, F-09, F-10, F-12, F-13, F-14, R-01, R-02, R-03, R-05, R-06, R-07, R-08)

City of Ventura, City Council (F-01, F-02, F-03, F-04, F-05, F-06, F-07, F-08, F-09, F-10, F-12, F-13, F-14, R-01, R-02, R-03, R-05, R-06, R-07, R-08, R-09)

Meiners Oaks Water District, Board of Directors (F-01, F-02, F-03, F-04, F-05, F-06, F-07, F-08, F-09, F-10, F-12, F-13, F-14, R-01, R-02, R-03, R-05, R-06, R-07, R-08)

Triunfo Water & Sanitation District, Board of Directors (F-01, F-02, F-03, F-04, F-05, F-06, F-07, F-08, F-09, F-10, F-12, F-13, F-14, R-01, R-02, R-03, R-05, R-06, R-07, R-08)

Ventura County Board of Supervisors (F-01, F-02, F-03, F-04, F-05, F-06, F-07, F-08, F-09, F-10, F-12, F-13, F-14, R-01, R-02, R-03, R-05, R-06, R-07, R-08)

Ventura River Water District, Board of Directors (F-01, F-02, F-03, F-04, F-05, F-06, F-07, F-08, F-09, F-10, F-12, F-13, F-14, R-01, R-02, R-03, R-05, R-06, R-07, R-08)

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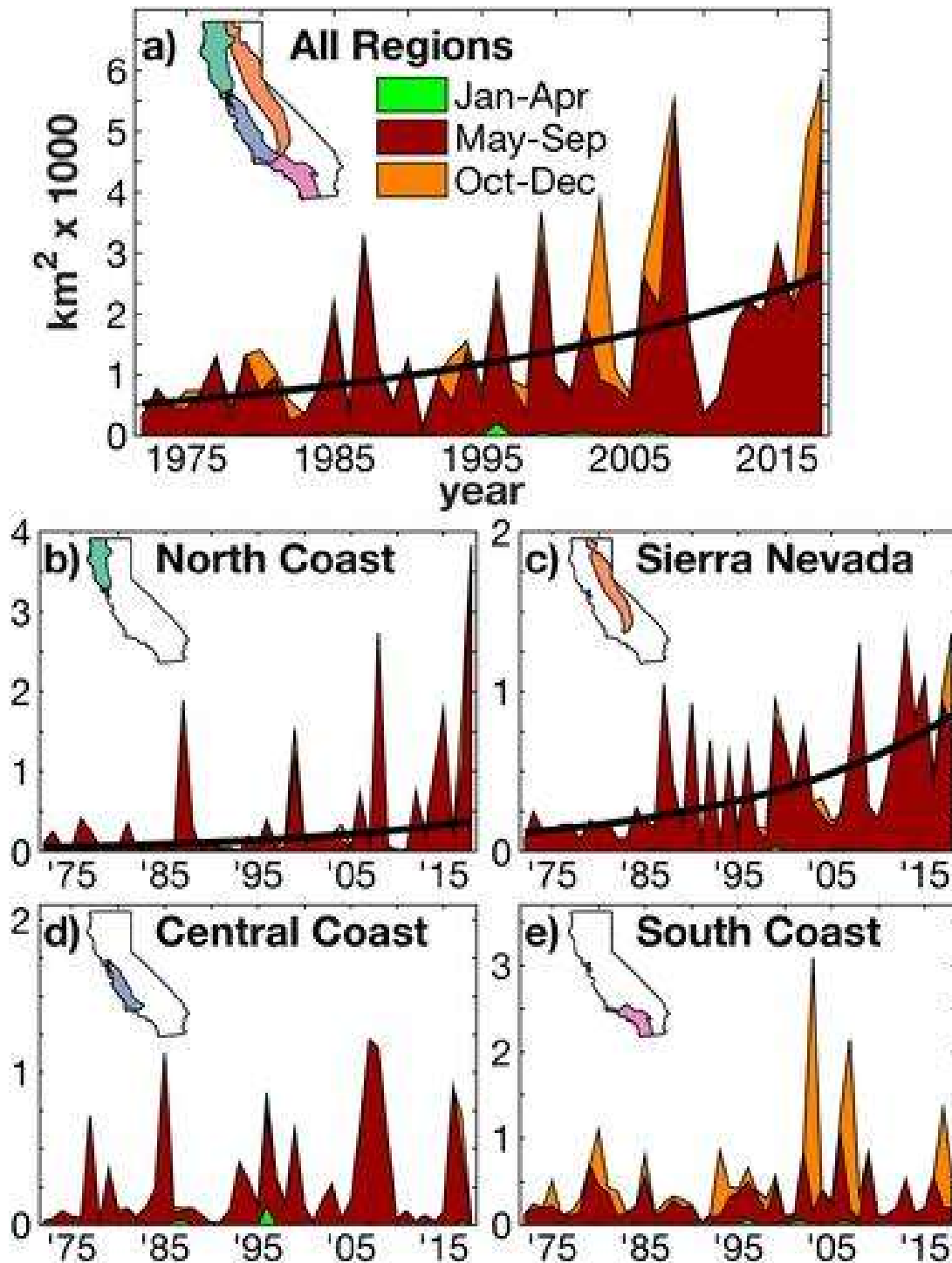
## GLOSSARY

<b><u>TERM</u></b>	<b><u>DEFINITION</u></b>
CalWARN	California Water/Wastewater Agency Response Network
FCC	Federal Communications Commission
FWW	Fire Weather Watch
GETS	Government Emergency Telecommunications System
NWS	National Weather Service
OES	(Ventura County) Office of Emergency Services
PSPS	Public Safety Power Shutoff
RFW	Red Flag Warning
SCADA	Supervisory Control And Data Acquisition
US EPA	United States Environmental Protection Agency
WFO	Weather Forecast Office
WPS	Wireless Priority Service
WUI	Wildland Urban Interface

## ATTACHMENTS

- Att-01.** Seasonal and annual burned areas in California for 1972–2018
- Att-02.** Red Flag Criteria (Los Angeles/Oxnard)
- Att-03.** Ventura County Major Fire Perimeters, last 20 years
- Att-04.** Wildfires History Map
- Att-05.** Ventura County Fire Hazard Severity Zones
- Att-06.** FWWs and RFWs in Ventura County, last 10 years

Attachment-01



Seasonal and annual burned areas in California for 1972–2018

Source: Ref-01

## Attachment-02

Los Angeles/Oxnard National Weather Service Criteria

# Red Flag Criteria

Weather Forecast Office (WFO)

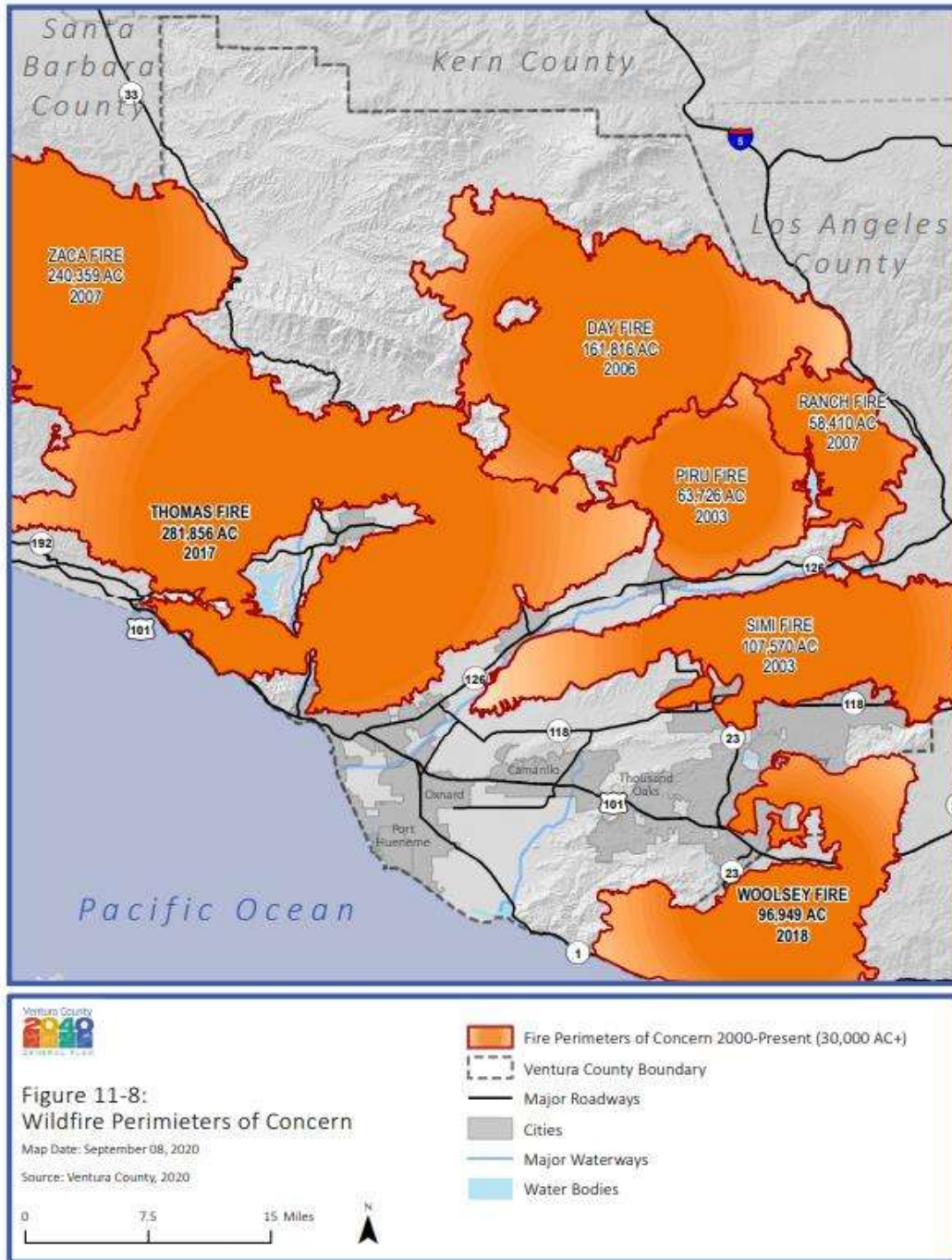
Los Angeles/Oxnard

Red Flag Criteria requires dry fuels and any one of the following:

1. Relative Humidity 13 percent or less with either sustained winds 25 mph or greater or frequent gusts 35 mph or greater (duration of 6 hours or more)
2. Relative Humidity 10 percent or less with either sustained winds 15 mph or greater or frequent gusts 25 mph or greater (duration of 6 hours or more)
3. Widespread and/or significant Dry Lighting
4. Other (forecaster discretion) unusual but significant metrological and/or fuel conditions in coordination with Geographic Area Coordination Centers (GACC) or local agency

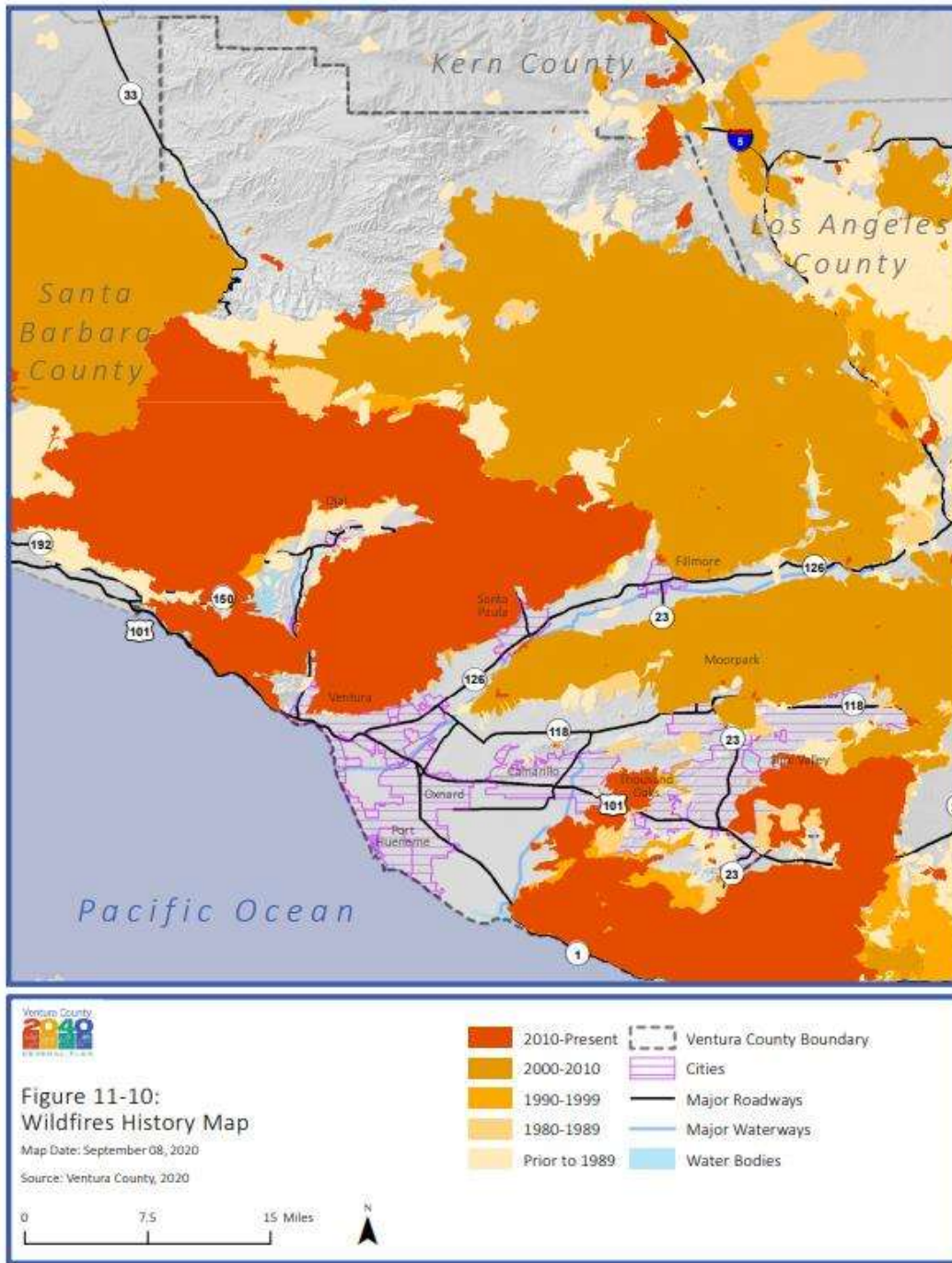
Source: Ref-04

### Attachment-03



Source: Ref-05

### Attachment-04



Source: Ref-06



## Attachment-06

Agency	Location of agency	# of Fire Weather Watch Alerts	10 Year Avg Fire Weather Watch Alerts	Total number of Fire Weather Watch days	Avg # of Days per Fire Weather Watch Alert	Number of Red Flag Warnings	10 Year Average Red Flag Warnings	Total number of Red Flag Warning days	Avg # of Days per Red Flag Warning Alert	Longitude	latitude
Camarillo Water	Camarillo	45	4.50	47.05	1.05	49	4.90	84.26	1.72	34.2164	-119.0376
Ventura County WWD #19	Somis	45	4.50	47.05	1.05	49	4.90	84.26	1.72	34.2584	-118.9956
Meiners Oaks WD	Meiners Oaks	54	5.40	53.07	0.98	56	5.60	109.46	1.95	34.4480	-119.2429
Upper Ventura WD	Ojai	54	5.40	53.07	0.98	56	5.60	109.46	1.95	34.4291	-119.2974
Ventura County WWD# 17	Bell Canyon	57	5.70	56.03	0.98	59	5.90	112.75	1.91	34.2081	-118.6875
Camrosa WD	Santa Rosa Valley	57	5.70	56.03	0.98	59	5.90	112.75	1.91	34.2456	-118.9011
Fillmore Water	Fillmore	57	5.70	56.03	0.98	59	5.90	112.75	1.91	34.3992	-118.9182
Ventura County WWD # 38	Lake Sherwood	57	5.70	56.03	0.98	59	5.90	112.75	1.91	34.1261	-118.8880
Ventura County WWD#1	Moorpark	57	5.70	56.03	0.98	59	5.90	112.75	1.91	34.2856	-118.8820
Triunfo WD	Oak Park	57	5.70	56.03	0.98	59	5.90	112.75	1.91	34.1751	-118.7580
Santa Paula Water	Santa Paula	57	5.70	56.03	0.98	59	5.90	112.75	1.91	34.3542	-119.0593
Simi Valley WWD #8	Simi Valley	57	5.70	56.03	0.98	59	5.90	112.75	1.91	34.2694	-118.7815
Thousand Oaks Water	Thousand Oaks	57	5.70	56.03	0.98	59	5.90	112.75	1.91	34.1811	-118.9110
Ventura Water	Ventura	57	5.70	56.03	0.98	59	5.90	112.75	1.91	34.2914	-119.2259
Trunfio WD	Westlake Village	59	5.9	58.32	0.99	59	5.9	107.07	1.81	34.1438	-118.7996
<b>Average</b>		<b>55</b>	<b>5.51</b>	<b>54.59</b>	<b>0.99</b>	<b>57</b>	<b>5.73</b>	<b>108.13</b>	<b>1.88</b>		
<b>Average Total Days</b>					<b>5.47</b>				<b>10.79</b>	<b>16.26</b>	

Compiled by the Grand Jury from the National Weather Service data base (Ref-10)