

# SCE's 2019 Wildfire Mitigation Plan

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SB 901 OIR - Introduction Workshop  
California Public Utilities Commission  
February 13, 2019



# Overview

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- 2019 Wildfire Mitigation Plan Outline
- Objectives of Plan
- Risk-Based Approach to Programs and Activities
- Scope of SCE's 2019 Wildfire Mitigation Plan
- 2019 Goals and Metrics
- Potential Cost Implications

# Plan Outline

- SCE's 2019 Wildfire Mitigation Plan (WMP) follows the revised plan outline provided in Administrative Law Judge Thomas' January 17, 2019 Ruling:

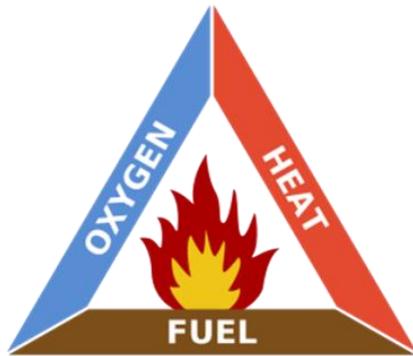
Chapter	Topic
Chapter 1	Objectives of the Plan
Chapter 2	Overview of the Wildfire Preventive Strategies and Programs
Chapter 3	Risk Analysis and Risk Drivers
Chapter 4	Wildfire Prevention Strategies and Programs
Chapter 5	Emergency Preparedness and Response
Chapter 6	Performance Metrics and Monitoring
Chapter 7	Cost Information

# Objectives of Plan

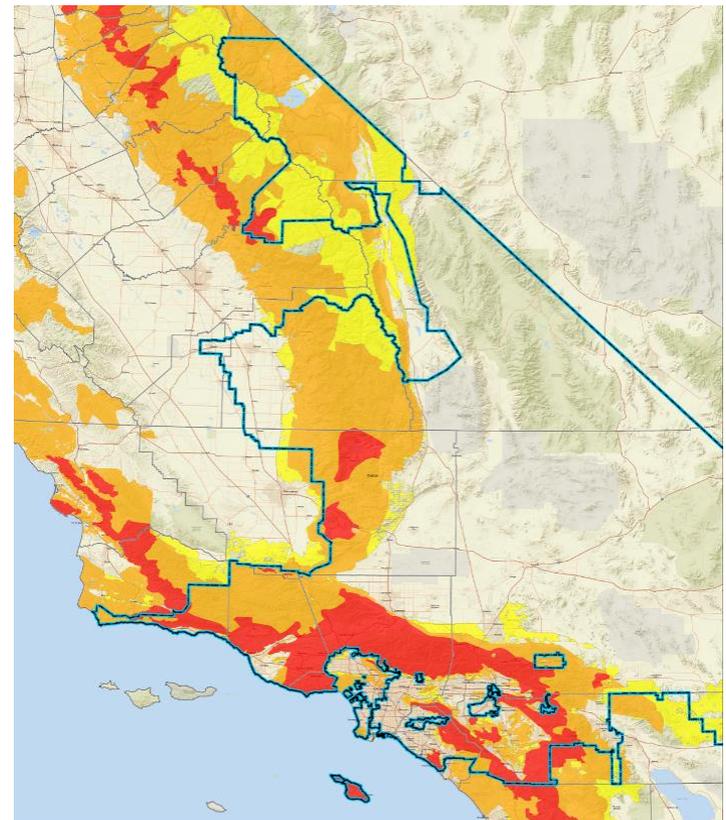
- Protect public safety
- Set forth an actionable, measurable, and adaptive plan for 2019 to reduce the risk of potential wildfire-causing ignitions associated with SCE's electrical infrastructure
- Implement measures that further harden SCE's electric system against wildfires and improve system resiliency
- Enhance wildfire suppression efforts by improving fire agencies' ability to detect and respond to emerging fires in coordination with utility emergency management personnel
- Reduce the impact of wildfires and wildfire mitigation efforts on the public
- Effectively communicate with customers, community groups, and other stakeholders about how to prevent, prepare for, and mitigate the effects of wildfires

# High Fire Risk Areas (HFRA) in SCE's Service Area

- ~35 percent of SCE's 50,000 square mile service area is located in HFRA
  - CPUC Tier 3 = ~18%
  - CPUC Tier 2 = ~9%
  - Other HFRA<sup>1</sup> = ~8%
- Programs and activities to reduce wildfire risk are focused in SCE's HFRA



- Heat (ignition source & energy level)
- Fuel (material or dry vegetation)
- Oxygen (catalysts or wind gusts)



- CPUC Tier 3 – Extreme Risk
- CPUC Tier 2 – Elevated Risk
- Prior CAL FIRE Fire Hazard Severity Zones<sup>1</sup>
- SCE Service Area

1. Areas within SCE's service area that continue to be designated as HFRA and are in the process of being evaluated to determine whether they remain as HFRA

# SCE's Wildfire Mitigation Strategy

SCE has taken substantial steps to reduce the risk of wildfires and will continue to proactively enhance our operational practices and infrastructure through our comprehensive wildfire mitigation strategy

**Long-Standing  
Operational  
Practices**

**Investing in  
System  
Hardening  
of Electric Grid**

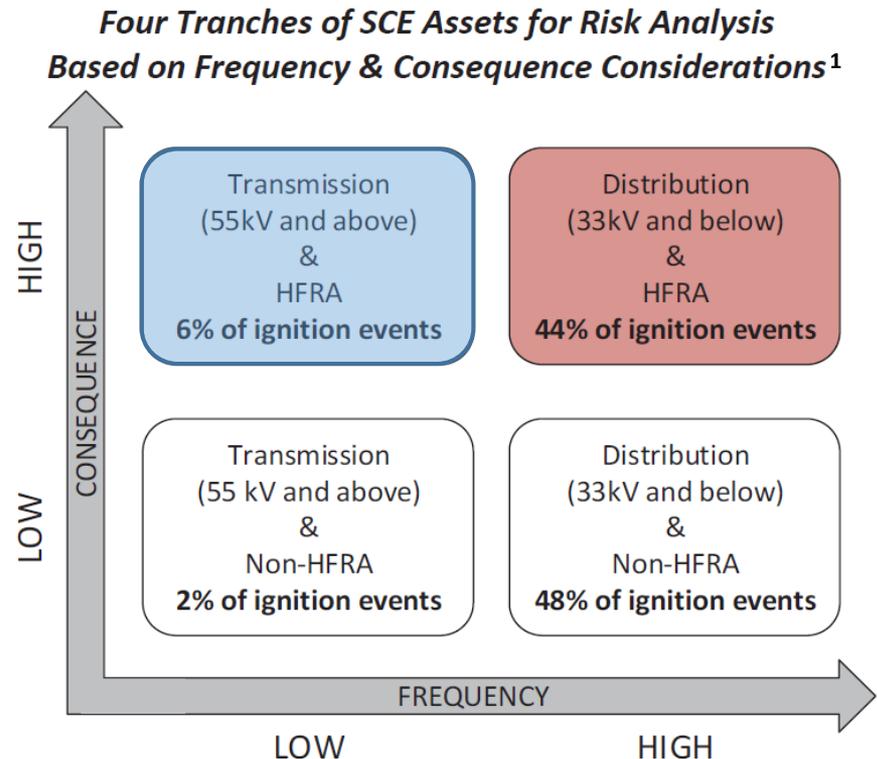
**Bolstering  
Situational  
Awareness  
Capabilities**

**Enhancing  
Operational  
Practices**



# SCE's Wildfire Mitigation Plan and Activities were Informed by a Risk Assessment

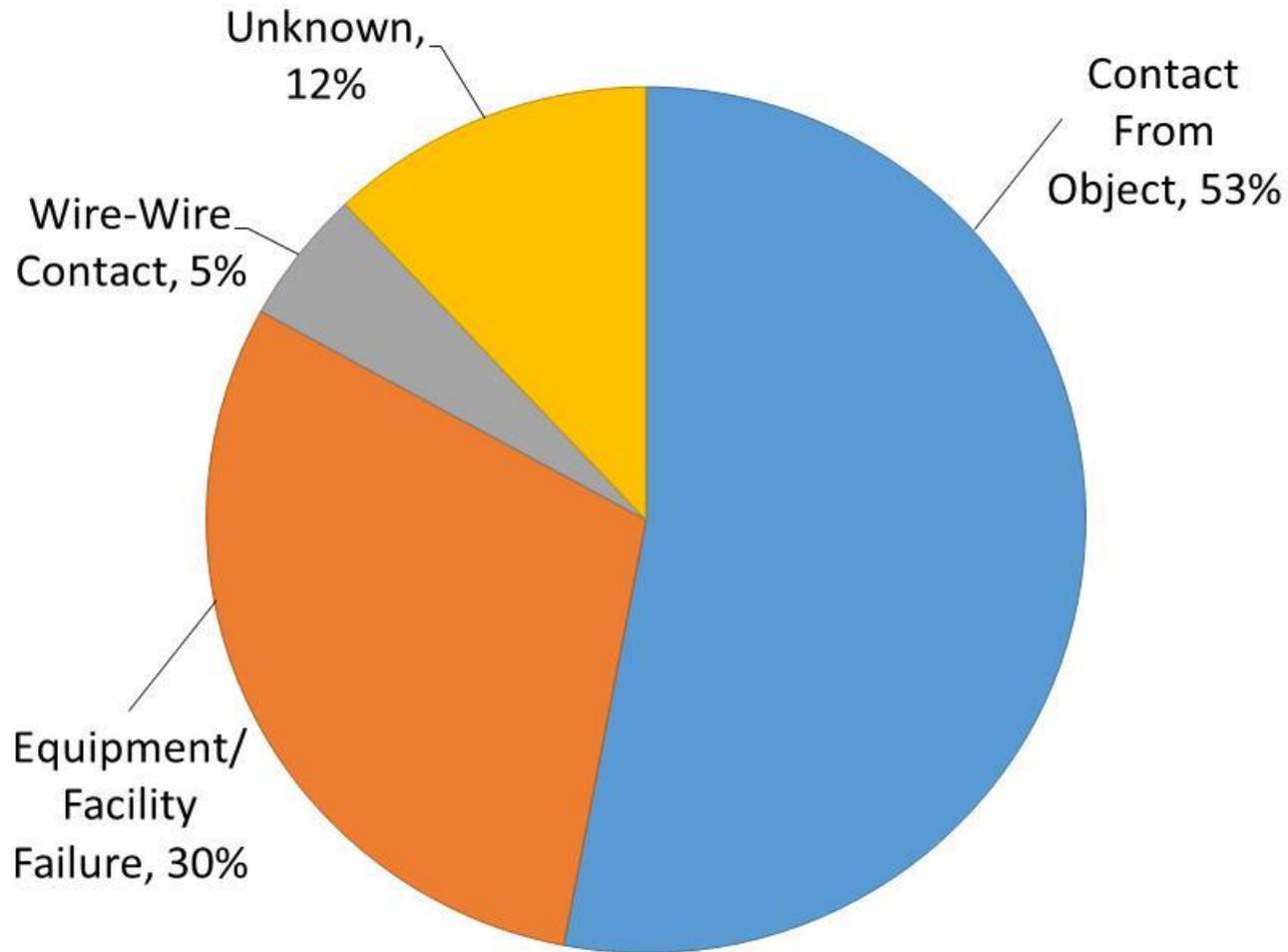
- Risk analysis determined highest consequence and frequency of ignitions related to distribution infrastructure in HFRA
- Informed by our risk assessment, most efforts are directed towards distribution infrastructure, however, SCE's WMP includes wildfire risk mitigation activities for transmission infrastructure



1. Based on historical 2015-2017 ignition data

# SCE Historical Ignition Causes Associated with Distribution Powerlines in HFRA (2015-2017)

- Wildfire Covered Conductor Program (WCCP) is a key activity to mitigate future ignitions from events historically associated with ~70% of utility distribution ignitions in HFRA

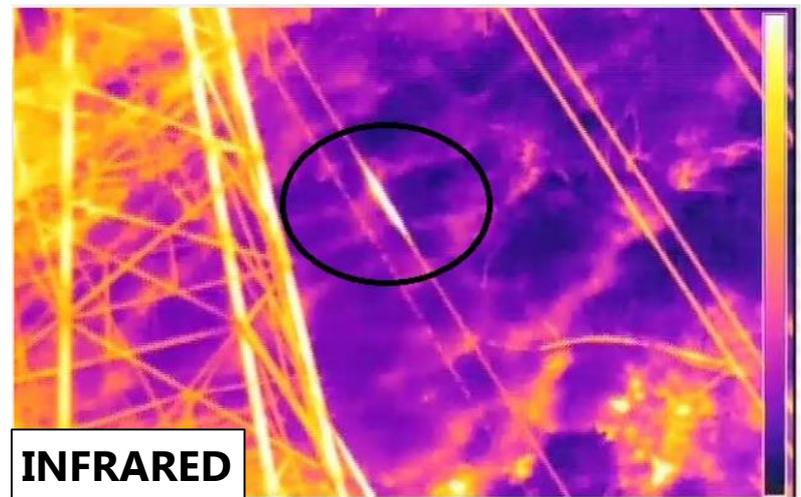


# Scope of SCE's 2019 SB 901 WMP

	<u>Mitigations</u>	<u>Activities</u>
<b>Operational</b>	<b>Inspections</b>	<ul style="list-style-type: none"> <li>Enhanced overhead inspections (EOI) on transmission and distribution structures in HFRA</li> <li>Various existing inspections (poles, switches, circuits, relays, etc.)</li> <li>Infrared, Corona scanning and high definition (HD) imagery</li> </ul>
	<b>Public Safety Power Shutoff (PSPS)</b>	<ul style="list-style-type: none"> <li>Effective communications and engagement with emergency services, customers and communities</li> </ul>
	<b>Situational Awareness</b>	<ul style="list-style-type: none"> <li>Weather stations and HD cameras per SCE's Grid Safety &amp; Resiliency Program (GSRP)</li> </ul>
	<b>Vegetation Management</b>	<ul style="list-style-type: none"> <li>Hazard tree removal per GSRP</li> <li>Vegetation removal at poles</li> <li>LiDAR surveying for transmission, supplemental inspections in HFRA</li> </ul>
<b>Infrastructure</b>	<b>Covered Conductor</b>	<ul style="list-style-type: none"> <li>Circuit miles of covered conductor in HFRA</li> </ul>
	<b>Undergrounding</b>	<ul style="list-style-type: none"> <li>Evaluation of targeted undergrounding in HFRA</li> </ul>
	<b>Other Infrastructure Mitigations</b>	<ul style="list-style-type: none"> <li>Various system hardening activities (e.g., composite poles, current limiting fuses (CLFs), remote automatic reclosers (RARs), Fast Curve settings)</li> <li>Studies, evaluations and pilots of alternative technologies</li> </ul>

# Enhanced Overhead Inspections (EOI)

- Inspect all overhead transmission and distribution structures and equipment in HFRA with a focus on conditions with potential ignition risk
- Inspections will result in activities, including vegetation pruning/removals and the repair or replacement of infrastructure, such as conductors, poles, cross arms, insulators, and transformers
- Additionally, SCE plans to inspect transmission power lines in HFRA using Infrared and Corona scanning technology and will capture HD images of identified anomalies



# Public Safety Power Shutoff (PSPS)

Pre-emptive de-energization of power lines to **prevent wildfire ignitions**

Many factors inform decision to de-energize, which include but are not limited to:

- **Real-time conditions**
  - Weather station data (e.g., wind speed, humidity, temperature)
  - Observations of trained field personnel embedded in local area
- **Input from fire authorities and Emergency Management personnel**
  - Evacuation orders / status
  - Impact on essential services
  - Location of evacuation centers
  - Other emergency operations



# Situational Awareness



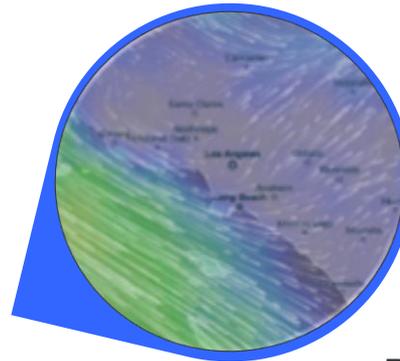
## Weather Stations

- Hi-res data
- Local weather



## Situational Awareness Center

- 24/7 monitoring
- SCE meteorologists



## Advanced Weather Modeling

- Better forecasting
- Advanced warning



## Fire Monitoring Cameras

- High-Definition
- Remote-controlled

# Real-Time Situational Awareness via HD Cameras



HFRA image feed publicly accessible: [www.alertwildfire.org](http://www.alertwildfire.org)

# Vegetation Management Program

- Remove dead, dying, diseased trees in HFRA (30,000 forecast)
- Remove additional 7,500 trees which pose a fall-in or blow-in risk to SCE electrical facilities in HFRA
- Expand vegetation clearance distances to 12 feet per CPUC recommendation for power lines up to 69 kV
- Inspect transmission lines using Light Detection and Ranging (LiDAR) technology to identify subject vegetation
- Joint patrols with fire agencies



Dead, dying, diseased and certain other trees present a hazard and are removed to protect electric facilities and reduce risk of fire

# Infrastructure - System Hardening Elements

## Hardened System

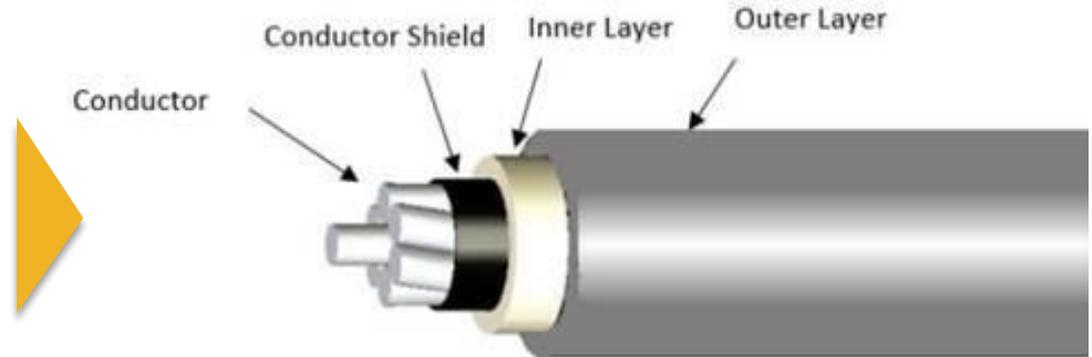


Insulated Wires /  
Covered conductors

Fast-acting, current  
limiting fuses

Fire-resistant poles,  
crossarms and  
insulators

## Covered Conductor



## Fast-Acting, Current Limiting Fuses (CLF)



ELF Current  
Limiting Fuse



X-Limiter CLF



# SCE 2019 WMP Goals and Metrics



## 2019 Goals

- Meet or exceed 34 goals in 2019 around specific actions conducted in HFRA directed at reducing wildfire risk

## Metrics

- Measure progress on plan execution across 8 metrics

## Indicators

- Track 3 indicators over time to assess the effectiveness of its cumulative wildfire mitigation strategies and programs

# Potential Cost Implications

Program Description	2019 Goal Capital Cost (\$M)	2019 Goal O&M Cost (\$M)	2019 Expansion/ Accelerated Capital Costs (\$M)	2019 Expansion/ Accelerated O&M Costs (\$M)
<b>SB 901</b>	113	180	116	189
<b>GSRP</b>	120	41	225	76
<b>Drought Catastrophic Event Memorandum Account (CEMA)</b>	N/A	41	N/A	41
<b>Fire Hazard Prevention Plan (FHPMA)</b>	5	28	5	28
<b>Total</b>	237	290	346	334

# Question & Answer Session

# Appendix

# Glossary of Terms

Term	Description
<b>CEMA</b>	Catastrophic Event Memorandum Account – used to track costs for catastrophic events
<b>Circuit miles</b>	Length of powerlines as measured between supporting structures regardless of number of wires
<b>CLF</b>	Current Limiting Fuse – fuse type that operates more quickly to reduce potential ignition energy
<b>Conductor</b>	Industry term for wire used to conduct electricity between source and destination
<b>Conductor miles</b>	Combined length of all individual wires on the powerlines
<b>CPUC</b>	California Public Utilities Commission
<b>EOI</b>	Enhanced Overhead Inspections – risk-based inspections beyond compliance-based inspections
<b>Fast Curve settings</b>	Settings that speed activation of protective devices to reduce potential ignition energy
<b>FHPMA</b>	Fire Hazard Prevention Memorandum Account
<b>GSRP</b>	Grid Safety and Resiliency Program
<b>HD</b>	High definition / high resolution
<b>HFRA</b>	High Fire Risk Area; CPUC Tier 2 and 3 fire-threat areas as well as additional areas SCE previously designated as high fire risk prior to development of CPUC fire-threat maps
<b>Indicators</b>	Defined in SB901 WMP to describe reportable data that have significant year-over-year fluctuations due to exogenous factors and should only be evaluated over longer, multi-year period for trends
<b>LiDAR</b>	Light Detection and Ranging; survey method using radar principles with lasers
<b>OIR</b>	Order Instituting Rulemaking - CPUC procedure to begin process to modify regulatory rules
<b>PSPS</b>	Public Safety Power Shutoffs – preemptively turning power off to circuits impacted by wind condition and elevated fire potential conditions (fuel moisture, dew point, wind speed)
<b>RAMP</b>	Risk Assessment Mitigation Phase – a pre-requisite filing of the GRC allowing the CPUC to understand how utilities identify/mitigate safety risk
<b>RAR</b>	Remote-Controlled Automatic Recloser – protective device that can be set to automatically re-energize a circuit following its initial activation; can be programmed for Fast Curve settings
<b>SB901</b>	Senate Bill 901 – legislation that requires utilities to submit Wildfire Mitigation Plan
<b>Tier 1</b>	CPUC fire-threat area defined by CAL FIRE/US Forest Service as having high tree mortality in direct proximity to communities, roads, and utility lines
<b>Tier 2</b>	CPUC fire-threat areas where there is an <i>elevated</i> risk (including likelihood and potential impacts on people and property) from utility associated wildfires
<b>Tier 3</b>	CPUC fire-threat areas where there is an <i>extreme</i> risk (including likelihood and potential impacts on people and property) from utility associated wildfires
<b>WCCP</b>	Wildfire Covered Conductor Program – major element of GSRP
<b>WMP</b>	Wildfire Mitigation Plan – annual compliance filing required by SB 901 (2019 compliance activities)

# SCE's Activities and 2019 Goals (1/4)

	ID	Activity	2019 Goal
<b>RAMP</b>	RA-1	Expansion of risk analysis	Conduct risk analysis which includes, but is not limited to, 2018 fire ignition data, additional distribution and transmission information, and consequence modeling to evaluate wildfire risk at a circuit segment level
<b>HFRA</b>	EVAL-1	Evaluation of HFRA boundaries	Complete evaluation of non-CPUC HFRA for retention or exclusion
<b>Ops</b>	OP-1	Annual System Operating Bulletin (SOB) 322 review	Review and update SOB 322 to reflect lessons learned from past elevated fire weather threats and integrate, where applicable, new and improved data from its situational awareness resources
	OP-2	Wildfire Infrastructure Protection Team additional staffing	Hire one additional meteorologist
<b>Inspections and Maintenance</b>	IN-1	Distribution Enhanced Overhead Inspections and Remediation in HFRA	1) Complete visual inspection of all distribution circuits in HFRA before May 31; 2) Remediate all conditions that create a fire risk in accordance with CPUC requirements
	IN-2	Transmission Enhanced Overhead Inspections and Remediation in HFRA	1) Complete visual inspection of all transmission circuits in HFRA before May 31; 2) Remediate all conditions that create a fire risk in accordance with CPUC requirements
	IN-3	Quality Oversight / Quality Control of EOI	1) Perform quality review on approximately 7,500 transmission and distribution structures in HFRA based on EOI inspections
	IN-4	Infrared inspection of energized overhead distribution facilities and equipment	1) Inspect 50 percent of overhead circuit lines in HFRA; 2) Remediate conditions as required based on inspection results
	IN-5	Infrared Inspection, Corona Scanning, and High Definition imagery of energized overhead transmission facilities and equipment	1) Complete IR, Corona, and HD image scanning of all overhead transmission lines in HFRA that are loaded to 40% of rated capacity or higher; 2) Integrate remediation with EOI activities

# SCE's Activities and 2019 Goals (2/4)

	ID	Activity	SB901 2019 Goal
<b>System Hardening</b>	SH-1	Covered Conductor	Install at least 96 circuit miles of covered conductor in HFRA
	SH-2	Evaluation of undergrounding in HFRA	Conduct evaluation of undergrounding for HFRA
	SH-3	Composite Poles and Crossarms	Install at least 1,100 composite poles
	SH-4	Branch Line Protection strategy	Install at least 7,500 current limiting fuses (CLF) in HFRA locations
	SH-5	Remote Controlled Automatic Reclosers installations	Install at least 50 new remote automatic reclosers (RAR)
	SH-6	Remote Controlled Automatic Reclosers setting updates	Update at least 150 existing RAR settings
	SH-7	Circuit Breaker (CB) fast curve settings	1) Develop engineering plan to upgrade remaining CB relays and update settings; 2) Conduct CB upgrades and setting updates according to plan

# SCE's Activities and 2019 Goals (3/4)

	ID	Activity	SB901 2019 Goal
<b>Vegetation Management</b>	VM-1	Hazard Tree Management program (HTMP)	1) Perform at least 125,000 tree-specific threat assessments in HFRA; 2) Perform at least 7,500 risk-based tree removals or mitigations in HFRA
	VM-2	Expanded Vegetation Clearing at Poles	1) Inspect all poles that require 10 feet of radial brush clearance at the base of the pole (at least 25,000); 2) Clear brush as necessary to achieve 10 feet of clearance
	VM-3	Expanded clearance distances at time of maintenance	Obtain tree-to-line clearance distance of 12 feet, as achievable, in HFRA at time of maintenance for line voltages of 2.4kV to 69kV
	VM-4	DRI quarterly inspections and removals	1) Perform all quarterly DRI inspections; 2) Remove identified dead, dying, or diseased trees in accordance with SCE's vegetation management program
	VM-5	LiDAR Inspections of transmission (220 kV and above)	LiDAR inspect at least 1,000 conductor miles in HFRA (results from LiDAR inspections will be used to inform of subject trees assessed under the Hazard Tree Mitigation program)
<b>Situational Awareness</b>	SA-1	Additional weather stations	Install at least 315 Units in HFRA
	SA-2	Fire Potential Index Phase II	Enhance capabilities of FPI by increasing granularity, adding historical climatology data, and expanding to cover all of SCE's service territory
	SA-3	Additional HD Cameras	Install at least 62 cameras on 31 towers to monitor HFRA
	SA-4	High-Performing Computer Weather Modeling System	Procure and install High Performance Computing Cluster weather and fuels modeling system
	SA-5	Develop Asset Reliability & Risk Analytics Capability	Complete implementation of the Asset Reliability and Risk Analytics tools

# SCE's Activities and 2019 Goals (4/4)

	ID	Activity	SB901 2019 Goal
<b>PSPS</b>	PSPS-1	De-Energization Notifications	1) Notify applicable public safety agencies and local governments of possible de-energization; 2) Notify Cal OES through the State Warning Center of possible de-energization; 3) Notify the CPUC of possible de-energization; 4) Enhance Emergency Outage Notification System (EONS) to include in-language messages
<b>Alternative Technologies</b>	AT-1	Alternative Technology Pilots	1) Pilot installation of 50 CAL FIRE-exempt surge arrester units in target locations; 2) Pilot meter alarming for downed energized conductor
	AT-2	GSRP Wildfire Mitigation Program Study	1) Evaluate Distribution Fault Anticipation (DFA) technology and conduct pilot installation of at least 10 DFA devices; 2) Evaluate Beyond Visual Line of Sight Unmanned Aerial System capabilities
	AT-3	Alternative Technology Evaluations	1) Evaluate Rapid Earth Fault Current Limiters/Arc Suppression Coils; 2) Evaluate alternate fault detection technology; 3) Evaluate fire retardant barrier for wood poles; 4) Evaluate substation-class electronic fuses; 5) Evaluate branch line protection to include single phase reclosing
	AT-4	Alternative Technology Implementation	1) Develop standard installation practices for Aeolian vibration dampers; 2) Develop standard installation practices for ridge pin construction for conductor rebuild; 3) Update distribution overhead requirements for connector selection in HFRA
<b>Emergency Preparedness</b>	DEP-1	Customer Education and Engagement	1) Conduct a direct mail campaign to inform customers in HFRA; 2) Develop Local Government Education and Engagement Community Meeting plan; 3) Execute Local Government Education and Engagement Community Meeting according to plan
	DEP-2	Emergency Responder Training	1) Wildfire response training for new or existing responders; 2) Conduct internal Incident Management Team training around Wildfires and PSPS
	DEP-3	Bolster Incident Management & Incident Support Team members	1) Determine positions that need enhanced staffing; 2) Train, exercise, and qualify new staff to meet identified need

# SCE's 2019 WMP Metrics and Indicators

## Metrics

### Programs

### Description

#### Patrols & Inspections

- Enhanced Overhead Inspections (EOI) in HFRA

#### Situational Awareness

- Weather stations installed
- HD Cameras installed

#### Vegetation Management

- Enhanced vegetation trees removed in HFRA
- Quality Control Inspections in HFRA
- Drought CEMA program trees removed in HFRA

#### Operational Practices

- Fuses installed

#### System Hardening

- Wildfire Covered Conductor Program (WCCP) miles hardened

## Indicators

### Description

- Wire downs on HFRA circuits
- Ignitions on HFRA circuits
- Count of all faults on HFRA circuits