SCE's 2019 Wildfire Mitigation Plan (WMP) Progress Update

CPUC WMP Phase 2 Workshop

September 17, 2019

(Data through July 2019)

Overview

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Activity Status

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- Off-Track or Other Notable Activities
- PSPS
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- Aerial EOI Findings

SCE's 2019 WMP Scope Background

- SCE is tracking 58 specific wildfire-related mitigation activities included in its 2019 WMP
  - SCE's WMP filing described 34 Activities (several have subparts, which adds 22 activities) and 8 metrics (6 of which are identical to the Activities)
  - Given Guidance Decision direction and for purposes of this status update, the additional 2 Metrics will be referred to as activities
  - Since filing its WMP, SCE has also commenced additional wildfire risk reduction mitigations including, for example, aerial EOI, community resource centers, and fuel sampling
- Statuses tracked for each Metric/Activity
  - Completed, Ahead of Plan, On Track, Off Track
  - Used to monitor performance and reflects current status not year-end outlook
  - Majority of Off Track activities' goals anticipated to be met by end of year absent exogenous events such as a major storm or earthquake

WMP Activities Summary

Not Started | Completed | Ahead of Plan | On Track | Off Track

Evaluation of HFRA

EVAL-1: Complete evaluation of non-CPUC HFRA for retention or exclusion

PSPS

PSPS-1: De-Energization Notifications

- PSPS-1.1: Notifications to public safety agencies and local gov't
- PSPS-1.2: Notifications to CalOES via State warning system
- PSPS-1.3: Notifications to the CPUC
- PSPS-1.4: Enhance Emergency Outage Notification System

Operation Practices

- OP-1: Review and update Annual System Operating Bulletin 322
- OP-2: Hire additional staff for Wildfire Infrastructure Protection Team

Risk Analysis

RA-1: Conduct risk analysis based on new expanded scope

Emergency Preparedness

DEP-1: Customer Education and Engagement

- DEP-1.1: Conduct a direct mail campaign for HFRA
- DEP-1.2: Develop local gov't ed. and engagement meeting plan
- DEP-1.3: Execute local gov't ed. and engagement meeting

DEP-2: Emergency Responder Training

- DEP-2.1: Wildfire response training for new or existing responders
- DEP-2.2: Conduct Internal IMT Training around WF response and de-energization protocols

DEP-3: Bolster Incident Mgmt. & Support

- DEP-3.1: Determine positions that need enhanced staffing
- DEP-3.2: Train, exercise, and qualify new staff to meet identified need

System Hardening

- SH-1: Install 96 circuit miles of Covered Conductor
- SH-2: Conduct evaluation of Undergrounding in HFRA
- SH-3: Install at least 1,100 composite poles
- SH-4: Install 7,500 Current Limiting Fuses (CLFs)
- SH-5: Install 50 Remote Controlled Automatic Reclosers (RARs)
- SH-6: Update at least 150 existing RAR Settings
- SH-7: Circuit Breaker Fast Curve
  - SH-7.1: Develop Engineering plan to upgrade Circuit Breaker relays and Settings
  - SH-7.2: Conduct Circuit breaker upgrades and setting updates according to plan

Situation Awareness

- SA-1: Install new additional weather units
- SA-2: Fire Potential Index Phase II. Enhance capabilities of FPI
- SA-3: Install additional HD Cameras
- SA-4: Procure and Install high performance computing cluster weather and fuels modeling system
- SA-5: Develop Asset Reliability & Risk Analytics Capability

Inspections

- IN-1: Distribution Enhanced Overhead Inspections and Remediation in HFRA
  - IN-1.1: Complete visual inspection for all distribution circuits in HFRA
  - IN 1.2: Remediate all conditions that create fire risk under distribution
- IN-2: Transmission Enhanced Overhead Inspections and Remediation in HFRA
  - IN-2.1: Complete visual inspection for all transmission circuits in HFRA
  - IN 2.2: Remediate all conditions that create fire risk under transmission
- IN-3: Perform quality review on transmission and distribution structures
- IN-4: Infrared Inspection of hot spots on overhead distribution facilities and equipment
  - IN-4.1: Inspect 50% of overhead lines in HFRA
  - IN-4.2: Remediate condition's as required based on inspection results
- IN-5: Infrared Inspection, Corona Scanning, and High Definition imagery of overhead transmission facilities and equipment
  - IN-5.1: Complete IR, Corona and HD image scanning of all overhead transmission lines in HFRA
  - IN-5.2: Integrate remediation with EOI activities

Vegetation Management

- VM-1: Hazard Tree Management Program (HTMP)
  - VM-1.1: Perform tree specific threat assessments
  - VM-1.2: Perform risk-based tree removals
- VM-2: Inspect and clear brush around poles
- VM-3: Achieve tree-to-line clearance distance of 12 feet in HFRA
- VM-4: DRI quarterly inspections and removals
  - VM-4.1: Perform all quarterly DRI inspections
  - VM-4.2: Remove trees in accordance with Veg Mgmt program
- VM-5: LiDAR inspections of transmission (220kV and above)
- VM-6.1: Inspect vegetation adjacent to Distribution Circuit Miles
- VM-6.2: Inspect vegetation adjacent to Transmission Circuit Miles

Alternative Technologies

- AT-1: Alternative Technology Pilots
  - AT-1.1: Pilot installation of 50 CAL FIRE-exempt surge arrestor units
  - AT-1.2: Pilot Meter Alarming for Downed Energized Conductor
- AT-2: GSRP Wildfire Mitigation
  - AT-2.1: Evaluate Distribution Fault Anticipation devices
  - AT-2.2: Evaluate Beyond Visual Line of Sight Unmanned Aerial System
- AT-3: Alternative Technology Evaluations
  - AT-3.1: Evaluate Rapid Earth Fault Current Limiters/Arc Suppression Coils
  - AT-3.2: Evaluate alternate fault detection technology
  - AT-3.3: Evaluate fire retardant barrier for wood poles
  - AT-3.4: Evaluate substation-class electronic fuses
  - AT-3.5: Evaluate branch line protection to include single phase reclosing
- AT-4: Alternative Technology Implementation
  - AT-4.1: Develop standard installation practices for aeolian vibration dampers
  - AT-4.2: Develop standard installation practices for ridge pin construction for conductor rebuild
  - AT-4.3: Update distribution overhead requirements for connector selection in HFRA

WMP Lessons Learned

Enhanced Overhead Inspection(EOI): Accelerated ground-based enhanced inspections for all structures in SCE's High Fire Risk Areas	• Moving from compliance-based to risk-based approach enhances ability to identify and remediate conditions that could lead to ignitions • Acceleration of ~450,000 inspections typically performed over 5-year cycle into 5-month plan enabled faster identification of findings but created challenges for meeting remediation compliance timeframes that are time-based vs. risk-based • Utilizing Incident Command System structure enabled rapid program development and execution • Adoption of digital tools (iPads, electronic reporting dashboards, etc.) using fast software development approach and close partnership with end users enabled speedy implementation • Improved EOI effort by initiating aerial EOI to identify conditions not visible from the ground (see Appendix for sample images)
EOI Remediation: Remediate EOI-identified inspection findings	• Significant amount of notifications requiring remediation work were created due to larger volume of inspections over shorter time period (on a per-structure-inspected basis, the number of notifications are similar to historical rates) • Having a consistent risk-based prioritization scheme across the entire HFRA was an important success factor to address all the higher priority findings • Establishing processes to manage large datasets (inspection findings, remediations, risk information) critical to effectively plan, prioritize, and manage work • Data cleanup and reconciliation is a significant effort due to high volume of notifications produced during EOI against pre-existing notifications generated from other inspection programs • Additional analytical and project management resources were need to track and manage across all aspects of the remediation work cycle, from Initiate, Plan, Schedule, Execute to Close • Use of temporary laydown yards located in strategic locations enabled greater efficiency in the flow of materials and allocation of work to field crews • Use of specialized planning teams are needed to address the high volume of remediations needing design work
Vegetation Management: Expanded program with greater volumes and new activities	• Increased vegetation work across California is driving scarcity and competition for resources • Challenges gaining customer and government agency support – customers and agencies are confused by the different activities occurring, do not agree with the value/efficacy of vegetation management for wildfire mitigation, or perceive potential environmental/aesthetic impacts as outweighing that value • Significant program expansion causing internal "growing pains" to develop systems, processes, and oversight
Human Resources: Contractor, SCE field workers, design/planning, etc. resource issues	• Internal resource constraints in planning, design, permitting, environmental and SCE field workers • External resource constraints with contractors: design resources, electrical crews, tree crews, and arborists • Public agencies such as Caltrans, cities, counties, etc. are also resource-constrained when processing large volumes of work in concentrated areas

WMP Lessons Learned (continued)

System Hardening: Hardening grid infrastructure to reduce ignition sources	• Despite slow start to covered conductor construction due to resource constraints and competing priorities with EOI effort, SCE is securing multiple suppliers and expediting work and expects to significantly exceed the 2019 goal • Surpassed branch line protection goal by completing current limiting fuses at 7,441 locations; Additional installations are underway and have learned that certain projected locations are not viable due to different field conditions • Success in securing multiple covered conductor vendors early – leveraged existing relationships with multiple suppliers (three currently approved, with others not yet approved but ready to provide product) to ensure planned capacity could be achieved recognizing that other IOUs may require the same production resources • Held technical conferences with multiple covered conductor suppliers, performed benchmarking with other utilities and industry organizations, and contracted with multiple consultants to ensure design standards are industry best practices • Early communication with field workers helps ensure construction standards are timely developed, tools are available, and proper work methods are followed
Risk Considerations: Improved risk analytics to identify and prioritize mitigation measures	• Improved granularity in risk modeling has been able to identify localized areas within Tier 2 that are higher risk than Tier 3 • Fire simulation studies provide understanding of risk exposure for localized areas such as segments of circuits • Revisions to HFRA boundaries are necessary to reflect changing conditions but significant resources and time required to conduct thorough analysis and change operational processes
Material Supply: Challenges with volume of work and lead times for certain materials	• Stockpile historical key materials in the event of shortages • Identify backup vendors in the event of unforeseen vendor circumstances • Explore creative alternative solutions to expand material supply options and address capacity constraints (e.g., fire wrapping of wood poles to address limited manufacturing capacity for fire-resistant composite poles) • Account for material shortages by establishing a materials gatekeeper team to ensure areas are addressed in priority order
Situational Awareness:	**Weather Stations** • Consider inclement weather, remote terrain and accessibility issues (e.g. snow, mud, etc.) when establishing installation schedule for weather stations. **HD Cameras** • Partnering with UCSD and working in close coordination with local fire agencies has been effective at identifying HD Camera locations and completing their installments • Perform siting early and encourage vendors to negotiate tower agreements early to avoid schedule delays • It is very important to coordinate locations with county and state fire agencies to identify optimal placement • Integrate cameras into internal GIS capabilities to provide common operating picture against IOU infrastructure

WMP Activities Status vs. WMP Activity Goals

Not Started | Completed | Ahead of Plan | On Track | Off Track

Operational-related Activities

PSPS: De-Energization Notifications (PSPS-1):

Local Govt and Agency PSPS Notifications
On Track

Notifications to Public Safety Agencies and Local Government (PSPS-1.1)
Volume vs 2019 Goal: Sent notifications for each of the 7 events to date in 2019
Key Actions: This Activity is triggered by a PSPS event where SCE is required to submit ESRB-8 documentation to confirm it met the requirements outlined by the CPUC.

State PSPS Notifications
On Track

Notifications to CalOES via State Warning System (PSPS-1.2)
Volume vs 2019 Goal: Sent notifications for each of the 7 events to date in 2019
Key Actions: This Activity is triggered by a PSPS event where SCE is required to submit ESRB-8 documentation to confirm it met the requirements outlined by the CPUC.

CPUC PSPS Notifications
On Track

Notifications to the CPUC (PSPS-1.3)
Volume vs 2019 Goal: Sent notifications for each of the 7 events to date in 2019
Key Actions: This Activity is triggered by a PSPS event where SCE is required to submit ESRB-8 documentation to confirm it met the requirements outlined by the CPUC.

Emergency Notification Enhancements
On Track

Enhance Emergency Outage Notification System (PSPS-1.4)
Volume vs 2019 Goal: PSPS messaging will be delivered in English plus the 5 primary additional languages within SCE's service area
Key Actions: All work tracks for this goal have begun. SCE.com Team is in in process of creating landing pages for In Language PSPS notifications. Translation vendor is in process of voice and text translations into the 5 additional languages. PSPS notification vendor ready to begin work to integrate voice messaging into their platform as soon as translation recordings delivered.

HFRA Boundary Evaluation
Complete

Evaluation of HFRA (EVAL-1)
Volume vs 2019 Goal: Evaluation complete; PFM filed on 8/19/2019
Key Actions: The technical review of non-CPUC HFRA evaluation results was completed and the non-CPUC HFRA boundary Petition for Modification (PFM) was submitted.

Wildfire Risk Analysis
On Track

Expansion of Wildfire Risk Analysis (RA-1)
Volume vs 2019 Goal: On track to conduct risk analysis incorporating 2018 fire ignition data, additional system information, and consequence modeling to evaluate wildfire risk at a circuit segment level.
Key Actions: SCE is developing and testing revisions to its wildfire risk modeling methodology that include segment-level probability of ignition calculations that incorporate system characteristics, fault / fire history, and local conditions, as well as localized ignition consequence risk.

SOB Review and Update
Complete

Review and Update Annual System Operating Bulletin 322 (OP-1)
Volume vs 2019 Goal: Review and update to non-CPUC HFRA complete
Key Actions: System Operating Bulletin (SOB) 322 was revised to include additional details on operating restrictions during elevated fire weather threats, blocking subtransmission reclosers, fast curve settings, and operations during PSPS events.

Hire Additional Meteorologist
Complete

Hire Additional Staff for Wildfire Infrastructure Protection Team (OP-2)
Volume vs 2019 Goal: Hired one additional meteorologist
Key Actions: Completed hiring of one additional meteorologist for the Wildfire Infrastructure Protection Team.

WMP Activities Status vs. WMP Activity Goals

Not Started | Completed | Ahead of Plan | On Track | Off Track

Inspection-related Activities

EOI

Dist.	Trans.
100%	100%
Inspected	
80%	40%
Remediated	

Enhanced Overhead Inspections (IN-1 & IN-2)

Volume vs 2019 Goal:
Distr. 100% of structures inspected
Distr. 80% of notifications remediated
Trans. 100% of structures inspected
Trans. 40% of notifications remediated

Key Actions: All EOI P1 notifications have been remediated within compliance dates and the top 2% of REAX scored P2's have also been remediated. Remaining P2 notifications are being remediated based on required compliance dates.

QC HFRA Inspections

228%

Structures Inspected

QC HFRA Inspections (IN-3)

Volume vs 2019 Goal: 17,080 of 7,500 structures inspected
Key Actions: Performed quality reviews on transmission and distribution structures in HFRA based on EOI inspections, more than doubled the goal amount, no further actions expected.

Overhead Line Inspections

15%

IR Scans Completed

Infrared Inspection of Hot Spots on Overhead Distribution Facilities and Equipment (IN-4)

Volume vs 2019 Goal: Approximately 15% completed of goal
Key Actions: Distribution IR Scanning encountered a slow start due to GIS system data discrepancies; however, data issues have been resolved and production will increase significantly in September. The program has identified several severe hotspot conditions in Redlands District (switches, splices, connectors) and several hot connectors in Arrowhead district

Infrared Inspections & HD Imagery

On Track

Infrared Inspection, Corona Scanning, and High Definition Imagery of Overhead Transmission Facilities and Equipment: Complete IR, Corona and HD Image Scanning of All Overhead Transmission Lines in HFRA (IN-5.1)

Volume vs 2019 Goal: 5,716 of 6,513 miles planned of overhead transmission lines have been flown utilizing IR and Corona scanning. 452 miles were loaded above 40% of rated capacity.
Key Actions: Data collection was temporarily restarted in June to collect IR/Corona data on generation ties coming out of Big Creek and Bishop. That data has been provided to Transmission Engineering for analysis and has since been received back. All data collection is currently on hold until ground temperatures decrease.

Integrate Remediation w/EOI Activities

On Track

Infrared Inspection, Corona Scanning, and High Definition Imagery of Overhead Transmission Facilities and Equipment: Integrate Remediation with EOI Activities (IN-5.2)

Volume vs 2019 Goal: Collaborating with Transmission Engineering to integrate remediation with their EOI work.
Key Actions: Any Priority 1 conditions or notification items are immediately provided to Transmission for evaluation and remediation. Priority 2 and 3 notifications will go through gate keeping and are entered into SAP with a completion date based on fire tier compliance timelines

WMP Activities Status vs. WMP Activity Goals

Not Started | Completed | Ahead of Plan | On Track | Off Track

System Hardening Activities

WCCP

84%

Circuit Miles Installed

WCCP (SH-1)

Volume vs 2019 Goal: 81 of 96 (84%) circuit miles installed
Key Actions: 324 circuit miles of non-Grid Resiliency overhead conductor work has been redesigned for covered conductor in HFRA. Some of this work will be executed in 2019. Advancing a portion of work scheduled to begin construction in 2020 to 2019.

Composite Poles

13%

Poles Installed

Composite Pole Installation (SH-3)

Volume vs 2019 Goal: 145 of 1,100 (13%) poles installed
Key Actions: The current plan to meet the 1,100 composite pole installations is more heavily weighted with installations in Q4 2019 as compared to the original goal plan created in 2018. Work orders including approximately 900 composite poles are in construction and are expected to be complete by year-end. In addition, construction of two circuits have been advanced from 2020 to 2019. Current outlook is Activity is expected to meet goal by year-end.

Underground work in HFRA

On Track

Evaluation of Undergrounding in HFRA (SH-2)

Volume vs 2019 Goal: On track to conduct assessment of undergrounding for HFRA
Key Actions: SCE has identified high risk circuit segments in HFRA for internal evaluation and consideration as a potential wildfire risk mitigation. SCE has assembled cross-functional teams including engineering, risk, and local district personnel to further evaluate potential underground scope at a local level for mitigation effectiveness, construction feasibility, and conditions/attributes that support undergrounding of overhead lines to mitigate wildfire risk.

Fuses

99%

Fuse locations completed

Current Limiting Fuses (SH-4)

Volume vs 2019 Goal: 7,441 of 7,500 (99%) fuse locations completed
Key Actions: Contractors on track to meet targets.

WMP Activities Status vs. WMP Activity Goals

Not Started | Completed | Ahead of Plan | On Track | Off Track

System Hardening Activities

RARs

8%

RARs Installed

Install 50 Remote Controlled Automatic Reclosers (RARs) (SH-5)

Volume vs 2019 Goal: 4 of 50 (8%) RARs installed. Although the goal plan assumed 10 installations per month from August through December, the current plan accelerates RAR installations and will result in being ahead of plan each month until the goal is met.
Key Actions: Additional RARs are being accelerated from 2020 to help ensure the successful 2019 outcome for RAR installations

Circuit Breaker Fast Curve

On Track

Circuit Breaker Fast Curve: Develop Engineering Plan to Upgrade Remaining Circuit Breaker Relays and Update Settings (SH-7.1)

Volume vs 2019 Goal: CB relays and update settings
SH-7.1.A: 60 Substations with 300 circuits scoped
SH-7.1.B: 45 Substations with 68 circuits being scoped
Key Actions: 7.1.A Projects scoped and handed off for design. 7.1.B Job walks scheduled for scoping activities to be completed by year-end.

RAR Settings

93%

RARs Updated

Update At Least 150 Existing RAR Settings (SH-6)

Volume vs 2019 Goal: 139 of 150 (93%) existing RAR settings
Key Actions: Install remaining 11RAR settings in substations by year end to meet 2019 goal.

Circuit Breaker Fast Curve

On Track

Circuit Breaker Fast Curve: Execute Circuit Breaker Relay and Settings Upgrades according to plan (SH-7.2)

Volume vs 2019 Goal: All projects have commenced engineering design, engineering contracts have been issued to the regional engineering vendors who are currently working on the design. Construction dates are being scheduled.
Key Actions: SH-7.2.A Engineering Milestone - Complete engineering for 22 stations by 3/25/2020, SH-7.2.B Major Materials – Complete procurement of major material for 22 stations by 9/7/2020, SH-7.2.C Construction Complete – In-Service 22 stations by 12/31/2020

WMP Activities Status vs. WMP Activity Goals

Not Started | Completed | Ahead of Plan | On Track | Off Track

Situational Awareness Activities

Weather Stations
88%
Weather Stations

Weather Stations (SA-1)
Volume vs 2019 Goal: 277 of 315 (88%) Weather stations complete
Key Actions: Preparing crews for more rural areas; install pace will slow due to accessibility challenges with remote locations of remaining sites

FPI Phase 2
Complete

Fire Potential Index Phase 2: Enhance Capabilities of FPI (SA-2)
Volume vs 2019 Goal: Enhanced capabilities of FPI by increasing granularity, adding historical climatology data, and expanding to cover all of SCE's service territory.
Key Actions: Fire Potential Index (FPI) Phase 2 consisted of the FPI being calculated at the circuit level across its HFRA below 6,000 feet.

HD Cameras
90%
Cameras Installed

HD Cameras (SA-3)
Volume vs 2019 Goal: 56 of 62 (90%) HD cameras installed
Key Actions: SCE and UCSD working in close coordination with local fire agencies for new camera locations. SCE working closely with local fire agencies and SCE fire management team to site the remaining locations.

Modeling System
0%
Operational HPCCs

Procure and Install High Performance Computing Cluster Weather and Fuels Modeling System (SA-4)
Volume vs 2019 Goal: 0 out of 2 HPCCs operational
Key Actions: Continue to support vendor in operationalizing HPCC at primary site, expected Q3. Backup site expected to be operational in Q4. Expecting to meet goal by year end.

Analytics
On Track

Develop Asset Reliability & Risk Analytics Capability (SA-5)
Volume vs 2019 Goal: Complete implementation of advanced analytics platform and tools.
Key Actions: SCE has completed an initial prototype of its in-house analytics capabilities to assess the structures/poles and associated conductor with the highest probability for wildfire ignition. SCE will continue to develop and mature its ignition modeling and the ability of wildfire mitigations to reduce risk at a structure/pole/conductor level.

WMP Activities Status vs. WMP Activity Goals

Not Started | Completed | Ahead of Plan | On Track | Off Track

Vegetation Management Activities

Enhanced Veg. Mgmt
41%
Trees Assessed

Perform Tree Specific Threat Assessments (VM-1.1)

Volume vs 2019 Goal: 50,845 of 125,000 trees (83% of YTD target)
Key Actions: Continue weekly discussions with Assessment contractors regarding status of resource commitments for certified arborists..

Enhanced Veg. Mgmt
13%
Trees Removed

Perform Risk-based Tree Removals (VM-1.2)

Volume vs 2019 Goal: 1,006 of 7,500 trees (44% of YTD target)
Key Actions: Address roadblocks for 9,400+ removal prescriptions in inventory. Streamline process for obtaining environmental clearance and permission from private and public property owners. Continue to strategize locations for assessment based on risk posed by tree density and patrol frequency in addition to wildfire potential. Likely will not meet goal due to lack of agency approvals.

Poles
49%
Poles Cleared

Inspect and Clear Brush Around Poles (VM-2)

Volume vs 2019 Goal: 49,265 of 100,000 poles (99% of YTD target)
Key Actions: Contractor continues to add resources needed to complete work on increased pole population.

Annual Pruning
New Clearance Distance Implemented

Achieve Tree-to-line Clearance Distance of 12 Feet in HFRA (VM-3)

Volume vs 2019 Goal: Obtain clearance distance of 12' as achievable
Key Actions: New standard (12' at time of trim) for distribution voltages piloted in Q1 and Q2. Implemented across HFRA for pruning taking place in June and beyond. Tree-specific exceptions evaluated to ensure regulatory clearance distance maintained. Hired "notification consultants" to provide direct customer interaction and address local opposition to deeper pruning. Working with local governments that have imposed additional restrictions/approvals to deeper cuts.

DRI Inspection
7,793
Trees Identified

Perform All Quarterly DRI Inspections (VM-4.1)

Volume vs 2019 Goal:
- Quarterly DRI Inspections on track
- 7,793 trees identified for removal in 2019 YTD

Key Actions: Continue historic continuous inspections (repeating approximately every 3 months) of areas identified by the CA Tree Mortality Task Force to identify trees that are dead, diseased, or dying.

DRI Removals
97%
% Active Inv. <180 days

DRI Tree Inspections & Removals (VM-4.2)

Volume vs 2019 Goal: >96% of active inventory removed less than 180 days old
- 7,793 trees identified for removal in 2019 YTD
- 6,970 trees removed in 2019 YTD
- Year-end outlook tracking to ~50% of ~30,000 WMP metric forecast

Key Actions: Continue historic removal of trees identified as dead, diseased, or dying. Easing of drought conditions has reduced the volume of trees requiring removal (30,000 originally forecast based on historic average).

LiDAR
29%
Circuit Miles Inspected

LiDAR Inspections of Transmission (220kV and above) (VM-5)

Volume vs 2019 Goal: 290 of 1,000 circuit miles flown (174% of YTD target)
Key Actions: Executed four contracts to obtain LiDAR data on all bulk transmission lines and select sub-transmission lines. Vegetation data received in Q2 is being used to identify trimming locations in Big Creek area to ensure sufficient clearance under maximum conductor sag and sway conditions.

QC HFRA Inspections

Dist.	Trans.
106%	128%

Circuit Miles Inspected

Inspect Vegetation Adjacent to T&D Circuit Miles (VM-6.1 & VM-6.2)

Volume vs 2019 Goal: Inspected vegetation adjacent to 476 of 450 distribution circuit miles and 511 of 400 transmission circuit miles
Key Actions: Independent QC of annual pruning implemented across territory. Evaluates clearance distance obtained and prioritizes higher QC volume in HFRA. Work is ongoing in accordance with annual cycle.

WMP Activities Status vs. WMP Activity Goals

Not Started | Completed | Ahead of Plan | On Track | Off Track

Alternative Technology Activities

Surge Arrestor Units

50%

Units Installed

Alternative Technology Pilots: Pilot Installation of 50 CAL FIRE-exempt Surge Arrestor Units (AT-1.1)

Volume vs 2019 Goal: 25 of 50 pilot units installed

Key Actions: Pilot units being installed in Victorville District and plan to have all pilot units installed by end of year.

Meter Alarming

Complete

Alternative Technology Pilots: Pilot Meter Alarming for Downed Energized Conductor (AT-1.2)

Volume vs 2019 Goal: Completed pilot meter alarming for downed energized conductor

Key Actions: Pilot is now operational system wide

Fault Devices

On Track

GSRP Wildfire Mitigation: Evaluate Distribution Fault Anticipation Devices (AT-2.1)

Volume vs 2019 Goal: Evaluate fault technology and complete pilot installation of at least 10 DFA devices. Engineering design is complete for 60 DFA devices to be installed at 7 substations. 0 installations have been completed as of August 2019.

Key Actions: Install all devices per plan prior to year-end. First device will be installed October 2019.

Unmanned Aerial Systems

On Track

GSRP Wildfire Mitigation: Evaluate Beyond Visual Line of Sight Unmanned Aerial System (AT-2.2)

Volume vs 2019 Goal: Develop statement of work, issue RFP , select vendor, and perform demonstration flights

Key Actions: Next steps include issuing the purchase order, conducting UAV patrol flights, and drafting a final report on successes, lesson-learned, and suggestions for operationalization

Fault Current Limiters/ Arc Suppression Coils

On Track

Alternative Technology Evaluations: Evaluate Rapid Earth Fault Current Limiters/Arc Suppression Coils (AT-3.1)

Volume vs 2019 Goal: Conduct assessment by end of 2019

Key Actions: Candidate substations/circuits identified and engineering models for pilot substation built. Simulation testing targeted for late September.

Fault Detection

On Track

Alternative Technology Evaluations: Evaluate Alternate Fault Detection Technology (AT-3.2)

Volume vs 2019 Goal: Conduct technology assessment by end of 2019

Key Actions: Open Phase Protection - 12 units installed in alarming mode for monitoring. Pilot radio deployment targeted for October. Lab testing of isolation banks targeted for late September.

Fire Retardant Pole Wraps

Complete

Alternative Technology Evaluations: Evaluate Fire Retardant Barrier for Wood Poles (AT-3.3)

Volume vs 2019 Goal: Evaluate use of wood pole with protective barrier

Key Actions: Completed evaluation of new fire-retardant wrap for wood poles as an alternative to fire-resistant composite poles; published associated design standards. Implementing fire-retardant wrap based on positive testing.

Fuses

On Track

Alternative Technology Evaluations: Evaluate Substation-class Electronic Fuses (AT-3.4)

Volume vs 2019 Goal: Conduct technology assessment by end of 2019

Key Actions: In process of hiring vendor to complete assessment. Anticipate completing assessment by year-end.

WMP Activities Status vs. WMP Activity Goals

Not Started | Completed | Ahead of Plan | On Track | Off Track

Alternative Technology Activities (Cont.)

Branch Line Protection

On Track

Alternative Technology Evaluations: Evaluate Branch Line Protection to Include Single Phase Reclosing (AT-3.5)

Volume vs 2019 Goal: Complete evaluation

Key Actions: Published pilot FuseSaver standards. Material being finalized for pilot unit installs. Targeting 4th quarter installation of 8 pilot units in Menifee. Evaluation expected to be completed by year end.

Vibration Dampers

On Track

Alternative Technology Implementation: Develop Standard Installation Practices for Aeolian Vibration Dampers (AT-4.1)

Volume vs 2019 Goal: Evaluate need for aeolian vibration dampers publish standards for use. Standards published for use of aeolian dampers with existing conductor.

Key Actions: SCE is working with vendors on product evaluation for need and use of aeolian dampers with covered conductor.

Conductor Rebuild Standards

Complete

Alternative Technology Implementation: Develop Standard Installation Practices for Ridge Pin Construction for Conductor Rebuild (AT-4.2)

Volume vs 2019 Goal: Standards published and operational

Key Actions: Installation practices updated for inclusion of ridge pin construction in high wind areas and is operational.

Dist. Overhead Requirements

Complete

Alternative Technology Implementation: Update Distribution Overhead Requirements for Connector Selection in HFRA (AT-4.3)

Volume vs 2019 Goal: Design and Construction standards published for connector selection for use in HFRA

Key Actions: The connector selection standards updated to require the use of CAL FIRE exempt bolted wedge connectors when working in HFRA.

WMP Activities Status vs. WMP Activity Goals

Not Started | Completed | Ahead of Plan | On Track | Off Track

Emergency Preparedness Activities

Direct Mail Campaign

On Track

Customer Education and Engagement: Conduct a Direct Mail Campaign for HFRA (DEP-1.1)

Volume vs 2019 Goal: On track to reach approximately 1.5 million customers in HFRA through 2019 direct mailer

Key Actions: SCE's Dear Neighbor letter to be sent to each customer in HFRA commenced on 9/5. Dear Neighbor Letter for customers in non-HFRA is under review and the target mail date by early October.

Develop Local Meeting Plans

Complete

Customer Education and Engagement: Develop Local Government Education and Engagement Meeting Plan (DEP-1.2)

Volume vs 2019 Goal: Develop meeting plan

Key Actions: Local Government Education and Engagement Community Meeting Plan has been developed and is the framework for SCE's execution.

Execute Local Meeting Plans

72%

Cities Engaged

Customer Education and Engagement: Execute Local Government Education and Engagement Meetings According to Plan (DEP-1.3)

Volume vs 2019 Goal: 105 of 145 (72%) community meetings

Key Actions: On track. Of the 145 cities in HFRA, SCE has met with 105 cities as of 9/5/2019

WF Response Training

On Track

Emergency Responder Training: Wildfire Response Training for New or Existing Responders (DEP-2.1)

Volume vs 2019 Goal: Wildfire response training for new or existing responders

Key Actions: Currently conducting training sessions for PSPS Incident Management Teams; On track to meet year-end goal

IMT De-Energization Training

Complete

Emergency Responder Training: Conduct Internal IMT Training Around Wildfire Response and De-energization Protocols (DEP-2.2)

Volume vs 2019 Goal: Conduct internal IMT Training around wildfire response and de-energization protocol

Key Actions: Conducted initial training of 175 persons on PSPS Incident Management Teams; Have continued to train additional persons as needed and identified and will continue trainings as needed.

Enhance Staffing

On Track

Bolster Incident Mgmt. & Support: Determine Positions That Need Enhanced Staffing (DEP-3.1)

Volume vs 2019 Goal: Currently expanding teams to enable additional scalability and additional training sessions will be held for new personnel being added to the teams; On track to meet year end goal

Key Actions: Stood up dedicated PSPS IMT and Task Force effective June, 2019. Provided specialized training and exercises for all PSPS IMT and Task for members.

Train New Staff

On Track

Bolster Incident Mgmt. & Support: Train, Exercise, and Qualify New Staff to Meet Identified Need (DEP-3.2)

Volume vs 2019 Goal: Currently expanding teams to enable additional scalability and additional training sessions will be held for new personnel being added to the teams; On track to meet year end goal

Key Actions: Stood up dedicated PSPS IMT and Task Force effective June, 2019. Provided specialized training and exercises for all PSPS IMT and Task for members.

Conclusion

- Overall, SCE is making good progress on meeting its 2019 WMP Goals
- Activities that are off-track are monitored closely and majority are expected to meet their goals by end of year
  - VM-1.2 Risk Based Tree Removals impacted by delays in obtaining property owner permissions
- Significant learning has triggered improvements in processes, structure, systems, and has led to new Activities
- Resource constraints continue to be a challenge across key Activities
- SCE will continue to make improvements and refinements to its wildfire mitigation programs as lessons are learned and new information is obtained

Appendix

WMP Activities Status

Off-track or other notable activities

Current Goal	Narrative
SH-3: Install at least 1,100 composite poles **145 of 1,100 composite poles installed (13%)**	**Summary:** Slow start in construction is due to resource constraints and competing priorities with the EOI effort. Execution plan is backloaded in Q3 and Q4 to coincide with the covered conductor work. Expecting to meet the goal at year-end. **Progress/Challenges:** Current process of reporting completions has a 30- to 60-day lag from when the work is completed and when the poles are recognized as complete in SCE's record-keeping system. In addition, the current plan to meet and exceed the goal is more back-end loaded in Q3 and Q4 than originally anticipated when the goal's monthly plan was established. **Actions to Improve or Sustain Performance:** SCE is improving its record-keeping systems to more timely capture completed work and is advancing construction on two circuits from 2020 into 2019.
VM-1.1: Perform tree specific threat assessments **50,845 of 125,000 trees complete (41%)**	**Summary:** Short of plan by 11,480 (18%). Goal is to meet 125,000 tree-specific threat assessments in HFRA. An accelerated plan for assessment has been defined: new assessor resources have been obtained and productivity is anticipated to increase. Expecting to meet the goal at year end. **Progress/Challenges:** SCE has instituted a new system for daily and weekly assessment productivity quotas and has recently hired additional contractor resources. **Actions to Improve or Sustain Performance:** Accelerate tree assessment volume to meet plan target.

WMP Activities Status

Off-track or other notable activities

Current Goal	Narrative
VM-1.2: Perform risk-based tree removals **1,006 out of 7,500 complete (13%)**	**Summary:** Short of YTD plan by 2,744 (73%). 7,500 tree removal goal may not be met due to lack of agency approvals. **Progress/Challenges:** 5,400 removals scheduled as of 7/30. SCE has instituted a new system for daily and weekly assessment productivity quotas and has recently hired additional contractor resources. SCE is improving its customer notification and consent processes which is expected to accelerate the tree removal volumes. The ratio of removal recommendations to assessments remains lower than originally forecast. **Actions to Improve or Sustain Performance:** SCE has recently streamlined its internal land ownership review processes and has accelerated certain planned areas into 2019.
IN 1.2: Remediate all conditions that create fire risk under distribution	**Summary:** Distribution EOI remediation is currently off track due to outstanding "Priority 2" notifications. Currently, there are a total of 2,660 notifications requiring remediation. Expected to have all 8 SCE regions in compliance by year-end 2019. **Progress/Challenges:** Year-to-date, SCE has completed ~52,000 distribution remediation notifications. There are a total of 2,660 notifications requiring remediation and an additional 4,029 notifications due by year-end. SCE is closely monitoring additional work scope that could be identified through other mitigation programs such as aerial inspections and infrared scanning. **Actions to Improve or Sustain Performance:** SCE is developing additional tactical reporting and tracking for adherence to work execution plans, ensuring that various internal organizations consult and coordinate on strategy-related decisions and changes in work scope. SCE continues to monitor in-flight inspection and data cleanup efforts.

WMP Activities Status

Off-track or other notable activities

Current Goal	Narrative
IN 2.2: Remediate all conditions that create fire risk under transmission	**Summary:** Transmission EOI remediation program is currently off track due to 1,849 outstanding past due notifications. Expected to have all 8 SCE regions in compliance by year-end 2019. **Progress/Challenges:** Transmission inspections of approximately 57,000 structures are 100% complete as of 5/31. Transmission past due (including EOI and weed abatement): 1,849. Some past due notifications are known to be field completed but are not yet reflected in SCE's system (SAP). **Actions to Improve or Sustain Performance:** SCE has developed enhanced reporting capabilities to streamline processing, prioritizing, scheduling, and completion of remediation work. SCE has also tasked its aerial inspection contractor to address challenges that may impact target completion dates.
SA-4: Procure and Install high performance computing cluster weather and fuels modeling system	**Summary:** The first High-Performance Computing Cluster (HPCC) in Irvine (Orange County) is on track to be fully operational by Q3. Backup HPCC is 2 months behind in being delivered to Alhambra (Los Angeles County) and the new target move date is late September / early October 2019 **Progress/Challenges:** SCE continues to make process improvements that should streamline the online dates of the two systems. **Actions to Improve or Sustain Performance:** SCE continues to operationalize the Irvine HPCC and is working with its third-party vendor to fast-track its final implementation. SCE will use lessons learned from the first installation to facilitate the completion of the second. -

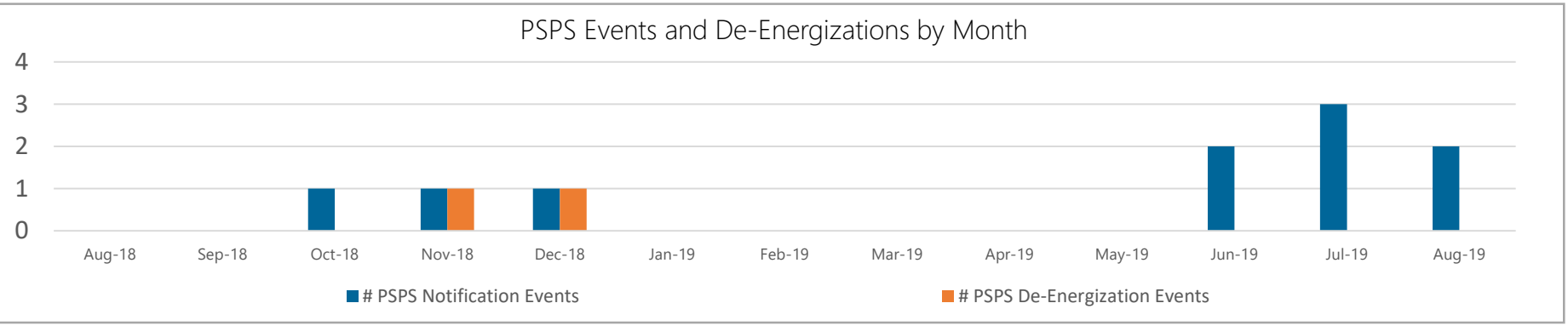
Public Safety Power Shutoff (PSPS)

Key Takeaways:

- 7 PSPS Notifications and 0 PSPS De-energizations YTD through July 2019
- 2019 Fast Curve Enabled/Blocked Recloser Events:
  - January to March – 0
  - April – 2
  - May – 3
  - June/July/August – 1 (same event has been ongoing since 6/1 and is forecasted to remain active between now and the end of the year, with a rotating list of circuits that are activated depending on local conditions)
  - The 6 events have affected a total of 80 days in 2019
- Actively engaging municipal utilities that may be potentially affected by a PSPS event

Lessons Learned:

- Refining PSPS monitoring triggers based on new, circuit level wind speed data, and expanding Fire Potential Index to account for unique fuel loading characteristic in respective fire climate zones
- Individual circuit exception process was established to address areas with low fuel loading
- IMT staffing is being increased to address team fatigue and extended activations
- 16 high Priority 2 notifications were remediated as a result of pre-patrol findings

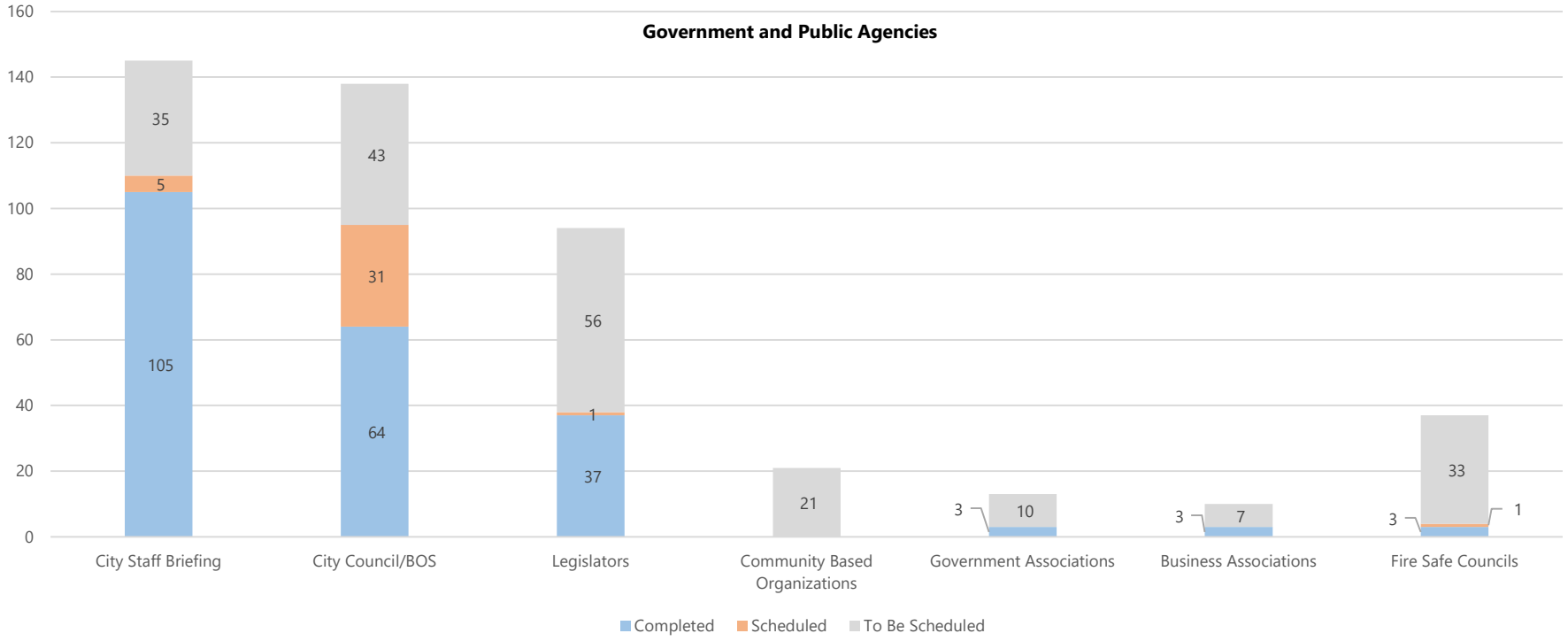


External Stakeholder Outreach

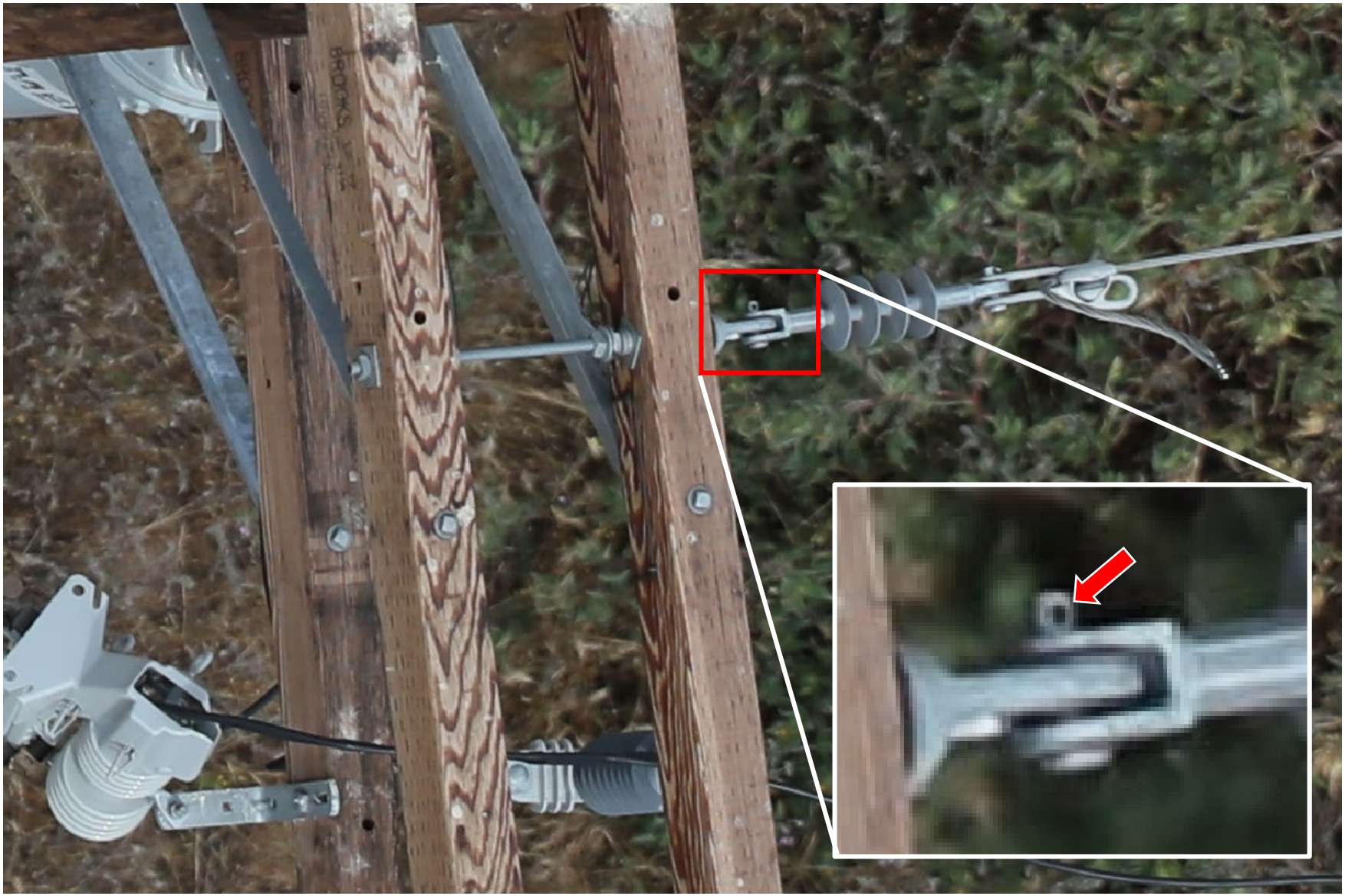
Overview:

- 72% of the outreach to cities and counties has been completed
- 8 community meetings have been held, with 4 to 5 more still to be scheduled
- Letters to all customers in HFRA began mailing on Sept. 5
- All PSPS and Vegetation Management communications materials have been updated and are posted on sce.com
- Several PSPS ad campaigns have been running since May 2019 – we are currently running radio and digital spots in the service territory through November 2019

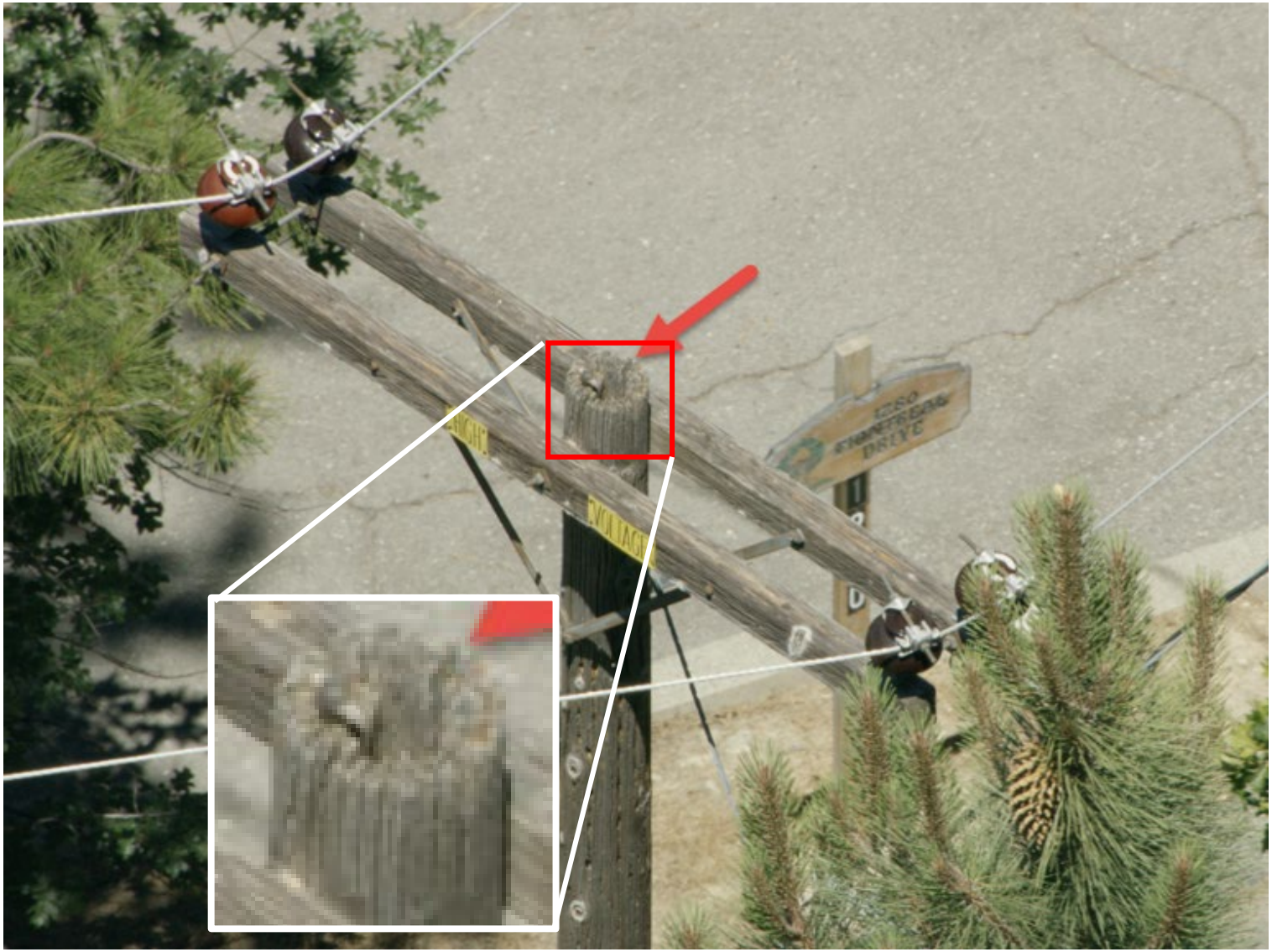
Community Meetings (Public)	Date	Complete
Joshua Tree/Yucca Valley	6/19	✓
Coachella Valley	6/20	✓
Wrightwood	6/25	✓
Tulare County	7/9	✓
Mono County/Inyo County	7/17	✓
Windsor Hills/Ladera Heights/Culver City	7/23	✓
High Desert	7/24	✓
Santa Paula/Fillmore/Ojai/Ventura	8/28	✓
Lake Arrowhead	9/19	
Bishop	10/2	
Kernville	10/10	



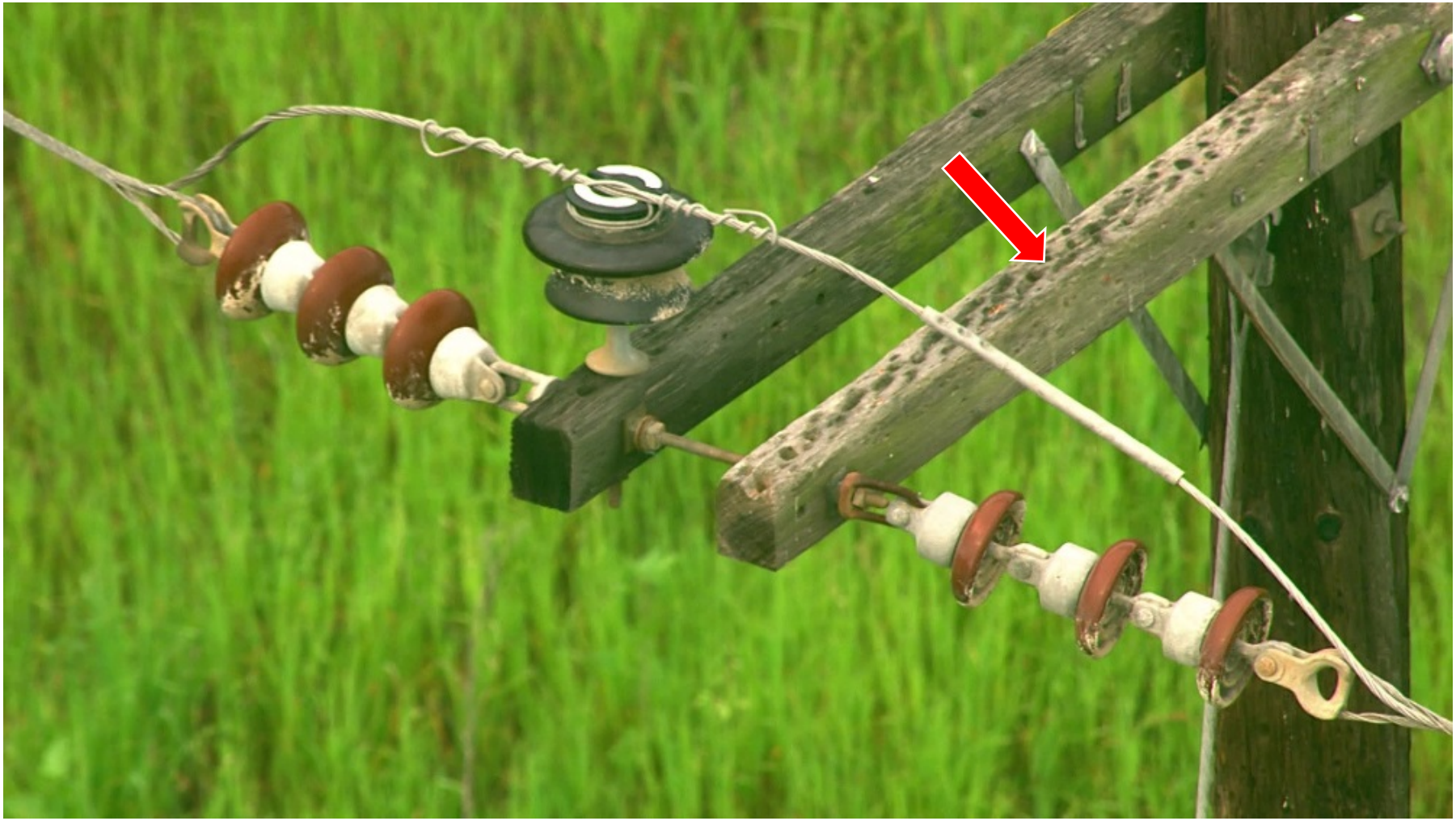
Aerial EOI Finding - Missing Cotter Pin



Aerial EOI Finding - Hollow Pole Top



Aerial EOI Finding - Deterioration on Top of Cross Arm



Aerial EOI Finding - Corrosion on Top of Transformer

