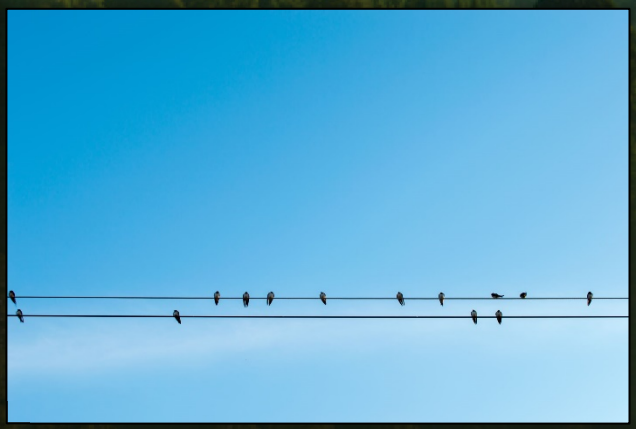
California Wildfire Safety Advisory Board

~~DRAFT~~ Recommendations on the 2021 Wildfire Mitigation Plan Updates for Large Investor-Owned Utilities



~~DRAFT~~ Revised for Board Meeting: April 1~~2~~4, 2021

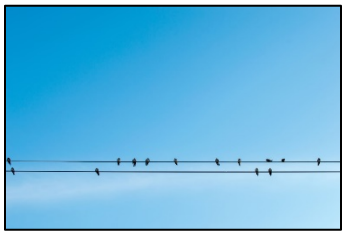
California Wildfire Safety Advisory Board

Cover Photos

Shown: **Chart with different trends**

The 2021 Wildfire Mitigation Plan Updates rely on various modeling methods to assist decision-making and prioritization of mitigation initiatives.

See Section 2 on Risk Assessment, Mapping, and Resource Allocation.



Shown: **Birds on utility lines**

Grid hardening measures such as covered conductors insulate utility lines and help prevent damage from different weather phenomena and all kinds of wildlife.

See Section 4 on System Design and Management.

Shown: **Top portion of a palm tree**

Non-native palm trees with rapid growth pose significant challenges for Southern Californian utilities.

See Section 3 on Vegetation Management.

Shown: **Operating controls of industrial machinery**

Utilities should eventually be able to reduce or eliminate the need for Public Safety Power Shutoffs (PSPS) because of increased grid hardening such as covered conductors, steel poles, storm guys, spacers, steel crossarms and undergrounding. Emerging technology like early fault detectors, sensitive profile relay settings and arc suppressors may reduce the need for PSPS by quickly shutting off the power during high wind events that actually cause faults.

See Section 4 on System Design and Management.

Background

Following the catastrophic fires of 2017 and 2018, the California Public Utilities Commission (CPUC) opened Rulemaking 18-10-007 to provide guidance on the form, contents, and process for review and implementation of the Investor-Owned Utilities' (IOUs) Wildfire Mitigation Plans (WMPs) to be filed pursuant to Senate Bill 901. Wildfire Safety Division (WSD) issued the WMP Guidance Decision (D.) 19-05-035 on June 3, 2019, in time for the large IOUs, three small and multijurisdictional utilities, and two independent transmission owners to act. Assembly Bill (AB) 1054 and AB 111 established the Wildfire Safety Advisory Board (WSAB or the Board) consisting of seven independent members appointed by the Governor, Speaker of the Assembly, and Senate Committee on Rules, and mandates the WSAB to develop and make recommendations related to the electric corporations' WMPs. To meet its AB 1054 mandate, the WSAB operates as an independent entity outside of the WSD and the CPUC, which has ensured its ability to provide separate analysis and expert guidance as the basis of its recommendations to the WSD on wildfire safety issues.

The WSAB is comprised of seven appointed member experts. Each board member brings a unique perspective and expertise to the state and to their review of the Wildfire Mitigation Plans.[1] Additional information about the Board and its members can be found on its website: www.cpuc.ca.gov/WSAB.

- Marcie Edwards, Chair
- Diane Fellman, Vice Chair
- Ralph Armstrong
- Jessica Block
- Chris Porter
- John Mader
- Alexandra Syphard

2020 ~~Activities~~Achievements

The WSAB is comprised of seven highly motivated members, appointed by the Governor, Speaker of the Assembly, and Senate Rules Committee for their expertise in the field of wildfire safety issues. Each WSAB member brings dedication and a unique perspective to support California's efforts in mitigating wildfire.

Since its inception, the WSAB has worked tirelessly to provide recommendations and advise the WSD on wildfire safety measures. The WSD considers the WSAB's guidance and recommendations in its evaluation of the WMPs. During 2020,[2] the WSAB:

- Developed a Mission Statement delineating the Board's objectives and informing its work;
- Created its infrastructure, protocols, and processes for meeting its AB 1054 and AB 111 mandate;

[1] The Board approves these recommendations as a whole, but each recommendation may not reflect the views of individual Board members.

[2] Further information about the Boards past and upcoming activities is available at www.cpuc.ca.gov/wsab.

- Held six public, virtual Board meetings that included robust debate on policy recommendations, and presentations from stakeholders that advance the WSAB's goal of bringing awareness to important issues in wildfire mitigation;
- Held one public workshop, gathering industry experts to explore best practices among publicly owned electric utilities and cooperatives;
- Independently evaluated, developed, and made recommendations to the WSD on the contents of the electrical corporations' 2020 WMPs;
- Presented recommendations for developing the System Hardening for Electric Utility Resiliency (SHEUR) Threshold;[3]
- Independently evaluated and made recommendations to the WSD on the 2021 Wildfire Mitigation Plan Guidelines, Performance Metrics, and Safety Culture; and
- Independently evaluated 50 publicly owned electric utilities and cooperatives' WMPs and developed a Guidance Advisory Opinion with recommendations on how to mitigate wildfire.

Acknowledgements

The WSAB recognizes California's IOUs dedication to wildfire mitigation as reflected in these plans and looks forward to continued collaboration. The Board is further appreciative of the WSD's efforts and appreciates the ability to provide observations and recommendations on the 2021 WMP Updates.

The WSAB published Draft Recommendations on April 1, 2021. On April 9, 2021, the WSAB received comments from Pacific Gas and Electric Company, Protect Our Communities Foundation, RS Technologies Inc., Southern California Edison Company, and San Diego Gas & Electric Company. On April 12, 2021, the WSAB received comments and attachments from Dan Courtney and Nancy Macy. The WSAB considers all comments it receives and greatly appreciates the feedback from stakeholders. All comments will be published at: https://www.cpuc.ca.gov/wsab/publiccomment/.

The Board acknowledges Vice Chair Diane Fellman's instrumental role during our first year in designing the framework in which the Board operates, including establishing our review structure and engagement procedures. Vice Chair Fellman is currently leading the Board's transition to the Office of Energy Infrastructure Safety under the California Natural Resources alongside the WSD. The Board acknowledges Chair Edwards and Vice Chair Fellman for successfully leading and organizing the team over our first year to establish a productive and diverse team.

We also acknowledge the dedication, creativity, and project management of our advisors, Katherine Stockton and Lea Haro. Their structure and guidance are essential for the WSAB. We are particularly grateful for our newest Advisor, Lea Haro who has provided the WSAB support and advice navigating our transition to the Office of Energy Infrastructure Safety under the California Natural Resources Agency.

[3] The WSAB presented recommendations to the WSD during the August 11, 2020, WSD Workshop. A recording of the presentation is available at https://www.cpuc.ca.gov/wmpworkshops/.

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1 Introduction

Pursuant to Public Utilities Code Section 8389(b)(1),[4] the Wildfire Safety Advisory Board (WSAB) provides these recommendations to the Wildfire Safety Division (WSD) for its consideration as it evaluates the sufficiency of the 2021 Wildfire Mitigation Plan (WMP) Updates for the large Investor-Owned Utilities (IOUs), Pacific Gas and Electric Company (PG&E), Southern California Edison Company (SCE), and San Diego Gas & Electric Company (SDG&E).

The Board's 2021 Observations

California's increase in wildfire events is partly attributable to several factors that become problematical when they occur synchronously. These include an extended period of drought, upwards of 10 years, increased fuel for fires in certain forest types, unprecedented climatological conditions cause extreme weather events, and housing expansion that increases the possibility of human-caused ignitions coinciding with extreme fire-weather. The most destructive wildfire seasons on record have occurred within the last four years, with a cumulative total of more than 50,000 structures destroyed and an unprecedented loss of human life. California also experienced a record-setting annual area burned in 2020. Utility-related wildfires have been responsible for a disproportionate share of wildfire-related consequences. We offer our assessment and these recommendations to inform the WSD's evaluation of the IOUs' 2021 WMP Updates.

The Board recognizes the IOUs' extensive effort to develop their WMP filings and acknowledges that the information has improved since the 2020 filings. In reviewing the IOUs' 2021 WMP Updates, the Board observed some recurring issues across the filings:

- *Format.* Overall, the WMP update format has been developed to ensure clarity of the IOUs' responses to previous recommendations. However, strict conformance to the Guidelines requires addressing the same topics across multiple sections of the WMPs and a consolidated presentation of the information would be useful. Further, it would aid the reviewer for the IOUs' WMPs to include illustrative examples, summary tables, and other visual aids to assess the objectives, inputs, outputs, and results of the different mitigation approaches.

- *Justification for Decisions.* The utilities' actions rely on various studies, direct experience, and feedback from the stakeholder and scientific communities. The WSAB would like to see more explanation of how the information that the utilities rely upon is used to make mitigation decisions. This additional rationale for mitigation choices would help the reviewer understand how each utility determined its preferred course of action was the most effective option.

- *Open Science.* Scientific reproducibility is essential to environmental research, ethics in machine learning,[5] and is fundamental to state and federal environmental regulation. A recent federal ruling enables the Environmental Protection Agency to use the best available open science in

[4] Public Utilities Code Section 8389(b)(1) states that the Board shall make recommendations to the WSD on "(1) appropriate performance metrics and processes for determining an electrical corporation's compliance with its approved wildfire mitigation plan."

[5] Wilkinson, M., Dumontier, M., Aalbersberg, I. et al. "The FAIR Guiding Principles for scientific data management and stewardship." Sci Data 3, 160018 (2016), https://www.nature.com/articles/sdata201618; *See also FAIR Principles*, GO FAIR Initiative, https://www.go-fair.org/fair-principles/ (last visited April 1, 2021).

regulation.[6] The WSAB looks forward to collaborating with the WSD to improve data transparency, including public availability, in establishing the appropriate performance metrics under Section 8389(b)(1).

In its next set of recommendations, the Board will focus on requirements in the 2022 Update Guidelines addressing these observations along with others. We look forward to collaborating with the WSD on the 2022 WMP Update Guidelines.

[6] David Malakoff, *Death of EPA's Controversial 'Censored Science' Rule Delights Researchers* (February 2021), https://www.sciencemag.org/news/2021/02/death-epa-s-controversial-censored-science-rule-delights-researchers.

2 Risk Assessment, Mapping ~~&~~ and Resource Allocation

Risk Spend Efficiency. The three IOUs appear to deploy and support improved forms of investment prioritization compared to their 2020 WMP filings. For example, SDG&E, is actively refining its process around resource allocation methodology to support the creation of long-term and immediate plans for capital investment, operation, and maintenance, as well as appropriate asset retirement. It has deployed a software solution from Copperleaf called C55 that will analyze an objective, risk-informed value framework, which will be applied to distribution, transmission, substation, and system protection assets. SDG&E's intention is to create a phased approach to implementing changes to their electric system infrastructure to manage wildfire risk more effectively.

Data, Modeling Methods and Assumptions. Each utility is producing more data than last year, some in the collection of field data, such as weather stations, and the creation of modeled data, such as weather, fuels, and other derived products. The WSD has done major heavy lifting in 2020 to define data schemas for reporting these data in standard Geographical Information Systems (GIS) formats.[7] This standardization is the first step in understanding what work is actually happening and what progress is being made. The WSAB also recognizes that each IOU's efforts to catalyze scientific progress with improved modeling is commendable.

In its review of the IOUs' 2021 WMP Updates, the WSAB did not find enough information about the modeling methods and assumptions to complete a thorough review and provide meaningful input. The 2021 WMP Guidelines require additional reporting in this area,[8] and the WMP Updates generally provide more information than the 2020 WMPs. While the WMPs include background, context and brief summaries of the models, there is not enough detailed information about their assumptions, algorithms, inputs, and outputs. If this information were available, the WSAB could provide feedback like the following (a hypothetical example):

> The sample size with presence-only MaxEnt modeling does not need to be as large as it would for inferential statistics (sources could be cited). Therefore, in addition to modeling outages as a proxy as the utility does, it could try to create models with real ignitions. Then the utility could compare model results to evaluate if there are any differences in outputs depending on whether they use outages versus ignitions as the response variable, for different ignition sources.

In vegetation management, the following feedback could be provided if sufficient information were included in the WMPs (another hypothetical example):

> Data for the response variable used in probabilistic, machine learning, or correlational niche models of the geographical distribution of vegetation risk should be collected using carefully stratified sampling designs. Otherwise, data collected from one part of a service territory may bias the model such that it is inappropriately applied to a different part of the service territory. For example, one part of the region may be prone to sick oaks that need to be removed to prevent contact with utility lines, whereas in other regions healthy oaks can be helpful wind breaks that prevent the spread of fire.

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[7] WSD GIS Data Reporting Standard for California Electrical Corporations – V2 (Feb. 4, 2021), available at https://www.cpuc.ca.gov/wildfiremitigationplans/ or ftp://ftp.cpuc.ca.gov/WMP/2021/GIS/WSD%20GIS%20Data%20Reporting%20Standard.pdf.

[8] Resolution WSD-011, Attachment 2.2, WSD's 2021 Wildfire Mitigation Plan Guidelines Template November 2020, Section 4.5.1, Additional models for ignition probability, wildfire and PSPS risk.

Decision-Making Based on Modeling Outcomes. The Board shares the WSD's and CPUC's concerns about PG&E's progress in the Enhanced Vegetation Management (EVM) program, especially the lack of prioritization of vegetation management initiatives based on risk modeling.[9] PG&E does appear to be making great progress in developing its risk models, but its WMP Update does not report outcomes or how the outcomes have influenced decision-making and prioritization.[10] The WMPs of all three IOUs would benefit from specific examples of how mitigation measures were prioritized based on these models.[11]

For example, the WMPs do not provide a description of how the IOUs evaluate crew related outages and fires, such as line strikes during vegetation removal or repair and maintenance. It is also unclear if the IOUs are factoring these crew related errors into their risk models. Descriptions of workflows would be helpful to understand each step from data collection, to model creation, to model outputs, and finally, decision-making. The WSAB expects all three IOUs to improve over time in describing how modeling outcomes have driven decision-making.

Scientific Review. Neutral peer review, collaboration, and more accessible data are necessary to ensure that the best emerging science, tools, and technology are being used. All three utilities are now creating their own in-house models and using models created by other vendors. The Board is concerned that the assumptions, algorithms, and outcomes of the models are not being closely and transparently reviewed by independent experts to ensure they meet scientific standards. For example, PG&E has consulted with experts for some of their LiDAR modeling initiatives,[12] but neither the results nor experts' findings have been made publicly available and it is unclear whether PG&E has shared this information with the WSD. As the IOUs have switched from Reax to Technosylva's fire modeling platforms, their risk priority outcomes will change, and the WMPs only report in general terms how the inputs to the models are different. Scientists must be able to access utility data, modeling methods, and assumptions to be able to reproduce what the utilities report in their WMPs, and to understand how data are influencing decisions. Without undergoing a transparent peer review process, neither the WSD nor the public can verify the accuracy of these models. Verifying the accuracy of the models is an essential step in reviewing the rationale for determining priorities. Further, these models must be vetted to ensure the prudent use of ratepayer funds.

Common Data System or Platform. The wildfire crisis has required rapid innovation. The WSD and the utilities are working diligently to use many innovative tools. The emerging science, tools, and technology are rapidly changing. The utilities, the WSD, and the CPUC must create structures that help the utilities adapt to the changing technology to ensure that they are using the best methods available to protect all Californians.

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[9] Draft Resolution M-4852: Placing PG&E into Step 1 of the "Enhanced Oversight and Enforcement Process" Adopted in Decision 20-05-053, and WSD'S Audit Report on PG&E's Implementation of their Enhanced Vegetation Management Program in 2020, published February 8, 2021.

[10] For example, PG&E 2021 WMP Update at 631-632, states, "[n]o section locations have been identified at this time," for vegetative fuel modification based upon its Vegetation Risk Model.

[11] SCE 2021 WMP Update at 83-86.

[12] PG&E's LiDAR Risk Score Model is being, "reworked, validated and vetted by a team of internal and consulting experts as well as an industry panel that was assembled by the North American Transmission Forum," PG&E 2021 WMP Update at 635 and 650.

A common data system would allow for streamlined parsing and evaluation of our environment as we move forward together. A centralized platform[13] that enables peer review[14] of data and models from the utilities is essential for accurately vetting utility processes, and for helping account for changes in the climate as they develop. Utility modeling tools must be capable of being tested against utility data. While the WSAB appreciates the sensitive and confidential nature of the data collected, there are ways to anonymize data so that it may be shared with the scientific community for peer review. Further, the IOUs should not maintain confidential modeling methods or implementation because this information may be considered proprietary.[15] The public safety of Californians depends upon our ability to reduce or eliminate utility-caused ignitions and wildfires. Risk modeling is a key piece of the puzzle that must be solved to eliminate these ignitions. The implementation of these models must be vetted to ensure that the utilities are using the best available science.[16]

BOARD RECOMMENDATIONS

1. The WSD should evaluate whether the WMP Updates provide enough information about modeling methods and assumptions for the WSD to complete its evaluation.
2. The WSD should request that the IOUs explain how they evaluate errors, such as line strikes, that occur during vegetation removal or repair and maintenance, and how these errors are factored into their risk assessment.
3. The WSD should consider whether the WMP Updates provide enough information about modeling outcomes and how these outcomes have impacted utility decision-making. For example, the WSD may need the IOUs to provide maps that visualize modeling outcomes and additional descriptions about how those outcomes resulted in specific mitigation decisions.
4. The WSD should establish a peer review process from the scientific community to evaluate the accuracy of the data, assumptions, methods, results, and interpretations for the different models. Alternatively, the WSD could direct the IOUs to establish a peer review process that the WSD could monitor as part of its compliance activities. The WSAB is available for collaboration on how this recommendation can be implemented to safely ensure that confidential data remain confidential.
5. The WSD should continue to explore its options working with the IOUs to develop a data access portal for interconnected data repositories and permission hierarchy.[17] The WSD has indicated it will incorporate this recommendation following the standardization of data metrics, processing, and analysis,[18] however, it may be necessary to begin work on a platform now, especially if a CPUC rulemaking or IOU application proceeding is required.

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[13] See the WSAB's Recommendations on the 2021 IOU WMP Guidelines, Section 3.2 at 27-28.

[14] Scientists are motivated to do this type of work because they receive credit for their review.

[15] For example, see SCE 2021 WMP Update at 58, for a description of the proprietary implementation of fire modeling methods.

[16] *FAIR Principles*, GO FAIR Initiative, https://www.go-fair.org/fair-principles/ (last visited April 1, 2021).

[17] See the WSAB's Recommendations on the 2021 IOU WMP Guidelines, Section 3.2 at 27-28.

[18] Resolution WSD-011, Attachment 1, Analysis and recommendations on Wildfire Safety Advisory Board (WSAB) recommendations at 11.

3 Vegetation Management: Inspections, Strategies and Pilots

Ecosystem and Climate Change Impacts of Tree Removals. Tree removal may be needed in many circumstances, such as when the tree causes an imminent risk of falling onto utility lines. In some cases, like in dense, over-vegetated forests, tree removal provides an overall positive impact on the ecosystem and in reducing wildfire risk. Tree removals can also be destructive, beyond community aesthetics, such as where trees are valuable to the ecosystem or prevent wildfire because they act as wind breaks. Legacy trees, for example should be evaluated with extra care because these trees may strongly contribute to dampening wind and preventing risk of landslide and runoff. Vegetation removal may have an impact on the climate; it may reduce carbon dioxide absorption, therefore increasing greenhouse gas emissions.[19] Utilities must consider the impact on the climate, the local ecosystem, and wildfire risk when removing trees. The WSAB understands the challenges that the terrain in PG&E territory presents compared to the other two large IOUs. A one-size fits all approach to vegetation management is not practical because of the research necessary to perform environmentally sustainable vegetation management practices. Ecologists can determine where the replacement of trees with other trees or native vegetation is necessary to prevent environmental destruction. Data scientists and modeling tools[20] can also help utilities make these decisions more easily. The WSD must evaluate whether utility wildfire mitigation practices increase the risk of wildfire or negatively impact climate change.

The WSD lists tree replacement as an initiative in section 7.3.5 of the WMP Guidelines, but only SDG&E describes a tree replacement program. SDG&E follows a wildlife-agency approved conservation plan and works with the U.S. Forest Service to implement best practices in protecting habitats and species. SDG&E also removes wood debris after work is completed, removes debris from waterways, and in 2020 diverted nearly 40% of the green waste from vegetation management operations to green waste facilities.[21] PG&E does not appear to have a tree replacement program. ~~While~~ SCE's ~~does not appear to have a~~ tree replacement program is part of its Hazard Tree Management program.[22]~~,~~ SCE obtains all the necessary environmental permits before initiating vegetation management activities, deploys environmental specialists, conducts field monitoring, and provides annual training for contractors in environmental regulations.[23] IOUs must work with ecologists and data scientists to determine where tree replacement is needed to prevent damage to the environment. Although replanting and replacing trees may have a high cost in the short-term, the potential negative impact in the long-term of tree removal will be borne by the ecosystem where that tree was removed, the local community, and future Californians because of climate change.

Environmental Impacts and the Creation of Hazards in Vegetation Management. The WSAB is very concerned about the instances where PG&E has been cited in violation of environmental regulations by different State of California agencies like the Coastal Commission, the Central Coast Regional Water Quality

[19] *Greenhouse Gas Emissions of Contemporary Wildfire, Prescribed Fire, and Forest Management Activities*, Public Comment Draft (Dec. 2020), California Air Resources Board, Section 3.4 Ecosystem Carbon Flow at 13, available at https://ww3.arb.ca.gov/cc/inventory/pubs/ca_ghg_wildfire_forestmanagement.pdf.

[20] For example, the modeling solutions presented by SALO and Tall Timbers during the March 2, 2021 WSAB Vegetation Management Workshop, webcast available at www.adminmonitor.com/ca/cpuc.

[21] SDG&E 2021 WMP Update at 265-266.

[22] SCE Comments on the April 1, 2021 Draft Recommendations on the 2021 Wildfire Mitigation Plan Updates for Large Investor-Owned Utilities (Draft Recommendations) at 4.

[23] SCE 2021 WMP Update at 255.

Control Board, the Department of Forestry, and Fire Protection (CAL FIRE).[24] The WSAB cannot comment on the merit of these notices of violations, but is troubled by the environmental impacts that are described therein such as discharges in waterways that are deleterious to fish and wildlife, and soil erosion from tree removal.[25] Further, WSAB is concerned about vegetation management practices that could create fire hazards such as not removing trees after being cut, and browning slash that is left behind.[26] If PG&E does not maintain fire access roads as it uses them, then violations such as these can result in limiting fire fighters' use these roads. It is essential that while adhering to WSD's Guidelines, ~~that~~ the utilities do not violate other state or federal agencies' regulations because of the negative environmental impact.

The WSAB is also very concerned about comments from the public about tree removals after wildfires.[27] Vegetation removal occurring during an evacuation should not be permitted. Residents must be informed of all planned activities. PG&E presented at the March 2, 2021, WSAB Vegetation Management Workshop and the WSAB greatly appreciates the open dialogue. PG&E discussed the negative view of many community members of PG&E's tree removal process and that PG&E is changing its practices.[28] PG&E's 2021 WMP Update does not describe in enough detail how their practices will change and lessons learned from 2020.[29] If community members are impacted enough by a vegetation management practice, there should be a review process to evaluate whether the removal of those trees is reasonable before the activity is performed. Further, the WSAB recommends the WSD review any notices of violation issued by other state agencies as they relate to utility wildfire mitigation programs like vegetation management and environmental stewardship. The WSAB is aware of utility training programs for utility vegetation contractors and some monitoring and auditing activities performed by the utilities. The WSD should assess whether these programs should be improved upon.

Database of Tree Species. PGE is updating its understanding of tree species characteristics based on outages.[30] PG&E, SCE, and SDG&E should explore creating a statewide database so all incidents can be recorded, with the information to benefit all. This database could also track how species characteristics vary along different environmental gradients. Plants and trees are still being referred to by their genus, of which there are hundreds of species contained within. This database could serve as a repository to start narrowing the information and traits of these species.

Utility Defensible Space Programs. The IOUs WMPs do not provide enough information about their Utility Defensible Space (UDS) programs. The IOUs discuss the potential environmental impacts of flame

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[24] Such as CAL FIRE Notices of Violation #1-5 between – CZU Lightning Fire Utility Work 1-20NON-00122-SCR October 30, 2020 and February 8, 2020, Central Coast Regional Water Quality Control Board December 15, 2020 Notice of Violation for Unauthorized Discharges No. 7019 0700 0001 7649 7673 (Central Coast Water Board NOV 7019 0700 0001 7649 7673), and California Coastal Commission Notice of Violation v-3-20-0089 for Tree Removal in Santa Cruz Mountains (Coastal Commission NOV v-3-20-0089).

[25] Central Coast Water Board NOV 7019 0700 0001 7649 7673 and Coastal Commission NOV v-3-20-0089.

[26] CAL FIRE November 11, 2020 Notice of Violation #2 – CZU Lightning Fire Utility Work 1-20NON-00122-SCR and related February 8, 2021 Notice of Violation #5.

[27] Public comments received by Nancy Macy and Dan Courtney at the WSAB Vegetation Management Workshop (March 2, 2021), and the WSAB Meeting (March 3, 2021), both webcasts available at www.adminmonitor.com/ca/cpuc.

[28] WSAB Vegetation Management Workshop (March 2, 2021), webcast available at www.adminmonitor.com/ca/cpuc.

[29] PG&E 2021 WMP Update at 627 - 628.

[30] PG&E 2021 WMP Update at 666 - 667.

retardant chemicals and herbicides that could be used to maintain the UDS or other utility right of ways. However, if low-growing, low-flammability plants are cleared, it will be difficult to maintain those areas without the encroachment of flammable flashy fuels. Invasive grasses that establish in the open space are much more flammable than many woody shrubs, and thus the clearance of woody shrubs could result in the opposite of the desired effect. The WSAB supports SCE's use of low-growing shrublands underneath lines and assets to serve as ember catchers to prevent the invasion of flammable grasses in these areas and recommends this approach for all three IOUs.[31]

BOARD RECOMMENDATIONS

1. The WSD should consider the impact of the IOUs vegetation management and tree removal practices on the environment, climate change, and wildfire risk. The WSD should consider whether the IOUs consulted with ecologists to plan vegetation management practices to reduce environmental impact.
2. The WSD should review any notices of violation issued by other state agencies as they relate to utility wildfire mitigation programs like vegetation management. The WSD should request that the IOUs' WMP Updates report any notices of violation issued by other state agencies ~~as they~~ related to ~~utility vegetation management and~~ environmental stewardship. The WSD should consider coordinating with other state agencies and experts to identify the most sustainable solution for all parties.
3. The WSD should evaluate whether the IOUs need to improve their training programs for vegetation management contractors and increase the auditing and monitoring of vegetation contractors.
4. The WSD should direct PG&E to stop the practice of removing ~~of~~ healthy trees following wildfire events without some kind of environmental review by an ecologist. Singed and even burned trees may still be healthy, not threatening to utility infrastructure, and be a valuable asset to its environment.
5. The WSD should explore the possibility of directing the IOUs to create a statewide database of tree species, traits, growth rates, morphological characteristics, and locations along environmental gradients.
6. The WSD should request that the IOUs WMP Updates explain how their vegetation management practices use Utility Defensible Space under utility right of ways. The WSD should direct the IOUs to perform a cost-benefit analysis to compare the benefits of low-growing shrubs versus clearance and chemicals.

[31] SCE 2021 WMP Update at 333.

4 System Design and Management: Grid Hardening, Operations, Inspections, and Emerging Technology

Emerging Technology. The WSAB is impressed with new technologies that are being piloted and deployed including: SCE's fault current limiters, ground fault neutralizers, resonant grounding with arc suppression, and coil and resonant grounded transformers;[32] SDG&E's technology for sensitive ground fault protection, sensitive profile relay settings, and high accuracy fault location;[33] and PG&E's distribution fault anticipation and fault current limiting technology.[34] This technology significantly reduces the size of the arcs in the event of a fault which increases worker safety and decreases the risk of ignition. If an ignition does occur, the risk of a high-consequence fire is reduced because the intensity of the arc is shorter, and the size of the arc is smaller. The WSAB encourages the IOUs to continue to explore technologies that reduce the risk of ignitions, recognize faults more quickly, and reduce the intensity of arcs. The IOUs could also explore different hardening methods that are used in other parts of the country that experience strong winds. For example, in Florida, where the utility lines are exposed to hurricanes and high-wind events, utilities often install guy wires to stabilize utility poles. Hardening measures like these could increase resiliency and allow for faster restoration times when utility lines do go out during a high-wind event.

Grid Hardening Progress. All three IOUs appear to have made great progress in meeting their 2020 WMPs' grid hardening goals and objectives, and most plan on continuing to make progress in 2021. In 2020, SCE installed more than 960 circuit miles of covered conductor and plans to install 1,000 circuit miles in 2021 and 1,600 circuit miles in 2022.[35] In contrast, Table 5-2 of SDG&E's WMP Update reports only 1.9 miles of covered conductor installation for its distribution system. However, SDG&E undergrounded 15.8 miles of electric lines and equipment in 2020 and plans to underground 25 miles in 2021,[36] which is more undergrounding than the other IOUs. The WSAB is concerned about PG&E's reduced system hardening commitment from 342 line-miles in 2020 in HFTD to 180 line-miles in 2021.[37] The reason for this reduction is unclear. PG&E has the largest service area of the three IOUs and has the greatest number of lines to harden.

Covered Conductors and Workforce Protection. SCE favors covered conductors as the hardening measure of choice. Although covered conductors have advantages in eliminating arcs that have the potential to initiate a fire, in areas where access is limited, covered conductors can create some safety challenges to the workforce assigned to perform work on them. For example, the removal and repair of covered conductor insulation can be hazardous if the wire is energized. The danger to the workforce further increases if the line being installed, repaired, or removed is located in a rural area and the workers do not have access to bucket trucks. However, none of the IOUs' WMP Updates describe their protocols to ensure the safety of their workforce when introducing new technologies or equipment, implementing new work practices, or during the removal, installation, and repair of equipment.

Idle Lines and Equipment. During the WSD's WMP workshop on February 22-23, 2021, in response to a question about the Kincade Fire, PG&E indicated that it addresses idle lines and takes them out of

[32] SCE 2021 WMP Update at 67 and 170-174.

[33] SDG&E 2021 WMP Update at 203.

[34] PG&E 2021 WMP Update at 301, 313-315, and 442-443.

[35] SCE 2021 WMP Update at 6.

[36] SDG&E 2021 WMP Update at 115-117.

[37] PG&E 2021 WMP Update at 9.

service.[38] However, none of IOUs' WMPs describe their protocols for the de-energization of idle lines and equipment. Several utility systems may have equipment such as transformers, jumpers, line sections, or secondary services that are not in use all the time but may still be energized. The WSAB supports this best practice, particularly in high fire threat areas where de-energization of idle lines and equipment would prevent sparks.

Workforce Training. As the IOUs begin to adopt new technology, it is imperative that they ensure that procedures are in place to protect the workforce. The IOUs current training looks at General Order (G.O.) 95 infrastructure and assets. All the IOUs appear to provide a robust plan for training a qualified workforce; however, the WMPs do not discuss when the training programs will begin or the length.

Qualified Electrical Workers. The WSAB is cognizant of the challenge that all three IOUs have with the scarce labor force compared to the need. The WSAB is glad that SCE is deploying Qualified Electrical Workers (QEW) to do some asset inspections. However, WSAB is concerned that other asset inspections are completed by Electrical System Inspectors (ESI).[39] These workers may not have enough field engineering capabilities and training to recognize all hazards and propose effective solutions. At a minimum, SCE should perform increased quality control for the annual inspections that are not performed by QEWs. SCE could re-inspect a larger sampling of inspections, close to the time the inspections were completed, to determine whether the ESIs are recognizing all hazards.

G.O. 95 Exempt Equipment. The WMPs do not provide information about facilities that are exempt from G.O. 95, neither inside, nor outside of HFTDs.[40] The WMPs do not highlight descriptions of G.O. 95 exempt equipment and inspection processes for exempted lines should be relayed to the WSAB through the WMPs as they relate to potential wildfire risk. The WSAB would like to understand how each utility identifies these risks on its own system and then better understand plans to mitigate the risk of exempt assets.

BOARD RECOMMENDATIONS

1. The WSD should consider the progress the IOUs are making in piloting different technologies that reduce the risk of ignition, recognize faults more quickly, and reduce the intensity of arcs. The WSD should encourage the IOUs to consider these types of technologies as well as lessons learned about grid hardening from other regions like the Southeastern United States, where hurricanes and high-wind events are frequent.

~~1.~~2. The WSD should consider the results of PG&E's 2020 progress metrics in grid hardening compared to the 2020 WMP targets.

~~2.~~3. The WSD should request the IOUs evaluate the risk involved in keeping idle lines or equipment energized versus disconnecting completely when not in use. The WSD should request that the IOUs ~~to~~ identify any equipment or lines that may still be energized and not in service and require the IOUS to remove or de-energize lines and equipment from service, which would lower the

[38] The webcast is available at www.adminmonitor.com/ca/cpuc.

[39] SCE 2021 WMP Update at 133-139 and 230-253.

[40] See G.O. 95 Rule 12.1 on applicability stating that "[t]he requirements apply to all such lines and extensions of lines constructed hereafter" the adoption of G.O. 95, which was adopted in 1941.

risk of those assets failing and causing a fire. If the IOUs have adopted the practice of de-energizing idle lines, then the WSD should request that they explain this in their WMPs.

~~3.~~4. The WSD should request that the IOUs explain their protocols to ensure the safety of its workforce during the removal, installation, and repair of equipment, especially when introducing new technologies or equipment, and implementing new work practices.

~~4.~~5. The WSD should request the IOUs provide more detail about how they will ensure the workforce will become qualified, their training plans, including start, length of the training, etc.

~~5.~~6. The WSD should order SCE to perform increased quality control for inspections that are completed by any worker with fewer qualifications than Qualified Electrical Workers, such as the Electric System Inspectors.

~~6.~~7. The WSD should request information from the IOUs about G.O. 95 exempt equipment so that it can track and monitor this equipment. The WSD should evaluate the sufficiency of the IOUs' plans or lack thereof to mitigate the increased risk this equipment poses, especially any equipment located in the high fire threat districts.

5 Public Safety Power Shutoffs: Reducing the Scale, Scope and Frequency

Modeling to Prioritize Mitigation Measures and Reduce PSPS. During the August 11, 2020 WSD workshop, the WSAB presented the System Hardening for Electric Utility Resiliency (SHEUR) threshold.[41] The WSAB recommended that the IOUs develop a methodology (such as the SHEUR threshold) for reducing the risk of both wildfires and PSPS events, and systematically prioritizing grid hardening measures through risk spend efficiency calculations that treat wildfires and PSPS events as risks for the IOUs to reduce the scale, scope, and frequency of PSPS. The Board is pleased that the IOUs are moving in this direction without direction from the CPUC. The IOUs' WMP Updates reveal the new modeling and risk prioritization processes that each developed over the last year, which address, at a more granular level, issues such as targeted grid hardening to reduce PSPS.

SDG&E provides an excellent example of a well-organized and adaptable program with its Wildfire Next Generation System (WiNGS) model, which analyzes circuit segments for wildfire risk and PSPS consequences. WiNGS also helps SDG&E prioritize grid hardening mitigations.[42] Both PG&E and SCE are in the process of developing more robust and adaptive predictive-models in this area. PG&E is working to de-scope transmission and distribution lines that have already been hardened from being subject to PSPS, in addition to improving its models that prioritize distribution hardening.[43] SCE indicates it is working on a methodology for evaluating the change in risk profile at specific locations that result from the potential allocation of mitigation resources. SCE is evaluating mostly hardening and vegetation management activities. It is attempting to determine if sufficient risk reduction results in, under certain conditions, the ability to exclude some circuits or circuit sections from PSPS events. This combined with risk spend efficiency calculations of wildfire risk avoidance and PSPS event risk is likely to drive transparent engineering decisions that will reduce undesirable conditions. This effort should be commended and is consistent with the WSAB's recommendation presented during the WSD's workshop on August 11, 2020.

PSPS Data Collection. All three of the IOUs' WMP Updates appear to track faults and wire down events that could have but did not result in a fire and categorize these events as near misses. However, none of the WMP Updates discuss taking the data collected when investigating near miss events and cross referencing it with PSPS events in areas where the IOUs have completed mitigation efforts for the purposes of evaluating the effectiveness of their mitigation efforts and resource allocation. It is not clear from the IOUs' WMP Updates if this is a missed opportunity to analyze the data they collected or if this evaluation and analysis is already taking place. For example, when tree branches from outside of the right of way are found in or on the line and cause damage to the line in areas where EVM and grid hardening efforts were completed but significant infrastructure damage still occurred, are the utilities only collecting this data for reporting near misses or are they using the data to evaluate their mitigation efforts? Collecting and analyzing this data would help evaluate the effectiveness of the IOUs mitigation efforts.

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[41] The WSAB presented recommendations to the WSD during the August 11, 2021, WSD Workshop. A recording of the presentation is available at https://www.cpuc.ca.gov/wmpworkshops/; *See also, WSAB Recommendations on the 2021 WMP Guidelines (June 24, 2020), available at www.cpuc.ca.gov/wsab.*

[42] SDG&E 2021 WMP Update at 12.

[43] PG&E 2021 WMP Update at 852-853.

BOARD RECOMMENDATIONS

1. The WSD should consider how the IOUs utilize data collected when investigating near misses during and after a PSPS event and request that the IOUs describe how they use data collected to evaluate their mitigation efforts.
2. The WSD should request that the IOUs conduct independent short and long-term studies that evaluate mitigation practices including Enhanced Vegetation Management, grid hardening, etc. to assess their effectiveness in mitigating wildfires. The studies should focus on areas where mitigation efforts have taken place and evaluate the data collected during patrols after a PSPS event.

6 Emergency Planning and Communication: Emergency Preparedness, Stakeholder Cooperation, and Community Engagement

Expanded Outreach in 2020 Compared to 2019. Overall, the IOUs did well in meeting the requirements of the WMP Guidelines with comprehensive detail regarding the efforts in these categories. In a marked improvement, each utility has demonstrated progress in 2021 WMP Updates maturity levels for these capabilities. Through broader and more sophisticated efforts in 2020, the IOUs expanded the outreach to federal, state, and local as well as tribal governments, the Access and Functional Need (AFN) communities, first responders, Community Choice Aggregators (CCAs), and customers. A myriad of communication channels from social media to direct contact covered multiple fronts within the challenging constraints of the COVID-19 pandemic protocols. Each IOU has established advisory committees to solicit advice and specific input on its activities ranging from targeted communities to wide-ranging safety issues to expand the actions while increasing the granularity.

SDG&E is committed to improving its well-established outreach program to reach a first-class level of engagement and cooperation.[44] SCE's stakeholder engagement has been refined but its PSPS actions are being reviewed in a CPUC proceeding[45] and may need to be more proactive. PG&E's stakeholder engagement appears to have significantly improved.[46] The WSD's sufficiency evaluation of the IOUs' efforts should acknowledge the regional and local wildfire safety efforts, PSPS-specific exercises to test the ability to communicate effectively with its public safety partners and customers, and customer support during emergencies. Further, AFN customers and other vulnerable customers have and should continue to be a focus to ensure uninterrupted, and carbon free where possible, power supplies.

Customer and Stakeholder Feedback. Each IOU offers data to quantify its outreach efforts and how it interacts with the affected populations e.g., social media outreach, PSPS information workshops, specific customer contacts.[47] This information is essential to track progress and quantify activities. However, an additional step should be considered. It would be useful to establish metrics to evaluate the impacts, cost-effectiveness, and general success of the IOUs' programs from the target population's perspective, which would inform the IOUs' communication and outreach activities as well as the effectiveness of their overall efforts.

The WSAB encourages the IOUs to build upon these efforts and continue to improve in the years to come. The Board suggests that an added dimension in the 2021 WMP Updates would have been if the IOUs evaluated whether stakeholders found the wildfire information accessible and useful. The Board suggests that WSD ask the utilities what metrics are being used to evaluate the sufficiency of these WMPs to determine if their outreach efforts have been successful along with how to identify best practices and implement lessons learned in the future to this capability.

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[44] SDG&E's 2021 WMP, p. 334

[45] As part of its ongoing action to reduce the impacts PSPS, the CPUC called upon SCE to publicly address the mistakes and operational gaps identified in its execution of its 2020 PSPS events and to provide lessons learned to ensure they are not repeated. Top SCE executives made presentations to the CPUC on January 26, 2021. SCE presented its Corrective Action Plan to the CPUC on February 25, 2021. Recordings of these meetings are available at www.adminmonitor.com/ca/cpuc.

[46] For example, PG&E's 2021 WMP, Section 7.3.9.2, p. 749

[47] SCE's 2021 WMP describes its regional prioritization and its monthly survey to capture awareness and perception metrics across a sample of its customers. See SCE 2021 WMP at 326-327.

BOARD RECOMMENDATIONS

1. The WSD should acknowledge the increased maturity level of the IOUs in the capabilities of emergency planning and preparedness, stakeholder cooperation, and community engagement.
2. The WSD should request as part of its review that the IOUs explain what metrics were used in the 2021 WMP Updates to evaluate the effectiveness of their stakeholder engagement efforts and inform what changes were made between the 2020 and 2021 WMPs.

7 Appendix I

Assembly Bill (AB) 111 (Committee on Budget, 2019)

AB 111 added, among others, Sections 326 and 326.1 to the Public Utilities Code. Section 326(a)(7) describes how the Wildfire Safety Advisory Board will coordinate with the Wildfire Safety Division to review safety requirements for utility electrical infrastructure. Section 326.1 describes how the Board will operate.

AB 1054 (Holden, 2019)

Section 2(e) of AB 1054 describes the legislative intent in creating the Wildfire Safety Advisory Board:

> The creation of a new Wildfire Safety Division will ensure safe operations by electrical corporations and the establishment of a Wildfire Safety Advisory Board will ensure that broad expertise is available to develop best practices for wildfire reduction.

AB 1054 added, among others, Sections 326.2 to the Public Utilities Code.

Public Utilities Code Sections 326, 326.1, and 326.2 are provided in the following pages.

STATE OF CALIFORNIA
AUTHENTICATED
ELECTRONIC LEGAL MATERIAL

State of California

PUBLIC UTILITIES CODE

Section 326

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326. (a) By January 1, 2020, the commission shall establish the Wildfire Safety Division within the commission, located in Sacramento, California. The Wildfire Safety Division shall do all of the following:

(1) Oversee and enforce electrical corporations' compliance with wildfire safety pursuant to Chapter 6 (commencing with Section 8385) of Division 4.1.

(2) In consultation with the California Wildfire Safety Advisory Board, develop and recommend to the commission performance metrics to achieve maximum feasible risk reduction to be used to develop the wildfire mitigation plan and evaluate an electrical corporation's compliance with that plan. For this purpose, "maximum feasible" means capable of being accomplished in a successful manner within a reasonable period of time, taking into account economic, environmental, legal, social, and technological factors.

(3) Develop a field audit program for wildfire mitigation plan compliance by each electrical corporation.

(4) Consult with the Office of Emergency Services in the office's management and response to utility public safety power shutoff events and utility actions for compliance with public safety power shutoff program rules and regulations.

(5) Support efforts to assess and analyze fire weather data and other atmospheric conditions that could lead to catastrophic wildfires and to reduce the likelihood and severity of wildfire incidents that could endanger the safety of persons, properties, and the environment within the state.

(6) Retain appropriate staff that includes experts in wildfire, weather, climate change, emergency response, and other relevant subject matters.

(7) Review, as necessary, in coordination with the California Wildfire Safety Advisory Board and necessary commission staff, safety requirements for electrical transmission and distribution infrastructure and infrastructure and equipment attached to that electrical infrastructure, and provide recommendations to the commission to address the dynamic risk of climate change and to mitigate wildfire risk.

(b) Effective July 1, 2021, all functions of the Wildfire Safety Division shall be transferred to the Office of Energy Infrastructure Safety established pursuant to Section 15473 of the Government Code.

(Added by Stats. 2019, Ch. 81, Sec. 7. (AB 111) Effective July 12, 2019.)

STATE OF CALIFORNIA
AUTHENTICATED
ELECTRONIC LEGAL MATERIAL

State of California

PUBLIC UTILITIES CODE

Section 326.1

326.1. (a) There is hereby established the California Wildfire Safety Advisory Board. The board shall advise the Wildfire Safety Division established pursuant to Section 326.

(b) The board shall consist of seven members. Five members shall be appointed by the Governor, one member shall be appointed by the Speaker of the Assembly, and one member shall be appointed by the Senate Committee on Rules. The members of the board shall serve four-year staggered terms. The initial members of the board shall be appointed by January 1, 2020. The Governor shall designate three of the initial members who shall serve two-year terms. Members of the board shall be selected from industry experts, academics, and persons with labor and workforce safety experience or other relevant qualifications and shall represent a cross-section of relevant expertise including, at all times, at least three members experienced in the safe operation, design, and engineering of electrical infrastructure.

(c) The board shall meet at least quarterly and alternate meeting locations between northern, central, and southern California, when feasible.

(d) Members of the board who are not salaried state service employees shall be eligible for reasonable compensation, not to exceed a per diem of four hundred dollars ($400), for attendance at board meetings.

(e) All reasonable costs incurred by the board, including staffing, travel at state travel reimbursement rates, and administrative costs, shall be reimbursed through the Public Utilities Commission Utilities Reimbursement Account provided for in Section 402 and shall be part of the budget of the commission. The commission shall consult with the board in the preparation of this portion of the commission's proposed annual budget.

(f) Communications by the board, its staff, and individual members of the board are not subject to the commission's ex parte rules set forth in Article 1 (commencing with Section 1701) of Chapter 9.

(Amended by Stats. 2019, Ch. 396, Sec. 15. (AB 1513) Effective January 1, 2020.)

STATE OF CALIFORNIA
AUTHENTICATED
ELECTRONIC LEGAL MATERIAL

State of California

PUBLIC UTILITIES CODE

Section 326.2

326.2. The California Wildfire Safety Advisory Board shall do all of the following:

(a) Develop and make recommendations to the Wildfire Safety Division related to wildfire safety and mitigation performance metrics.

(b) Develop and make recommendations related to the contents of wildfire mitigation plans pursuant to Chapter 6 (commencing with Section 8385) of Division 4.1.

(c) Review and provide comments and advisory opinions to each local publicly owned electric utility and electrical cooperative regarding the content and sufficiency of its wildfire mitigation plan and recommendations on how to mitigate wildfire risk.

(d) Provide other advice and recommendations related to wildfire safety as requested by the Wildfire Safety Division.

(Added by Stats. 2019, Ch. 79, Sec. 5. (AB 1054) Effective July 12, 2019.)