Optimizing Regional Wildfire Prevention and Mitigation in Southern California: A Pilot Program Proposal

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I. Executive Summary

Wildfires pose a significant threat to California's residents and natural habitats. The state's wildfire management infrastructure is robust but ill-equipped to confront pressing needs related to wildfire prevention and mitigation. These needs differ across the state's wide range of climatic and biological conditions.

Southern California faces a distinct host of impediments to wildfire risk reduction. These include disputes between community leaders, politicians, developers, environmentalists, and the public at large about proper wildfire risk reduction measures and inconsistent implementation of agreed-upon measures at the local level. The region is a patchwork of mitigation efforts ranging from the minimally effective to the exemplar. Variability in available funding, local politics, and the initiative taken by local fire management agencies contribute to this inconsistency and the relatively low fire resilience of the region. Southern California's meteorological conditions lead to fire mechanics that require specialized mitigation practices which differ from fire management measures utilized in other parts of the state.

State-level wildfire management efforts have historically focused on wildfire suppression; as a result, the state agency primarily charged with wildfire management responsibilities, the Department of Forestry and Fire Protection (CalFire), lacks a strong prevention and mitigation focus, and structural barriers exist that decrease the likelihood of a focus shift. Some experts have suggested the creation of a separate state agency with a specific mandate to manage wildfire prevention and mitigation efforts, but the process to create such an agency is likely to be drawn-out and politically fraught.

With sweeping statewide reform unlikely in the short term, this report focuses on steps that can be taken at the regional level in Southern California. A regional approach has the benefit of designing specific prevention and mitigation strategies to meet the needs of local communities and addressing the physical conditions particular to Southern California that drive wildfires in that part of the state. To those ends, we propose a pilot program for implementation in Ventura County, designed to build upon and optimize wildfire prevention and mitigation efforts there. It emphasizes community-driven initiatives related to home hardening, defensible space, fire area risk mapping, fuel treatment, and community outreach and education. Specifically, we recommend:

- Creating a community-based model for home hardening and defensible space and improving the hazard mapping system.

- Improving existing educational resources, creating more interactive teaching tools, and increasing community engagement.

- Dedicating resources to developing beneficial fire management-related partnerships with the private sector and public institutions.

- Undertaking a range of measures to streamline the publicly beneficial prescribed burning process.

Based on our research, we believe these initiatives can increase Ventura County's fire resistance and lay the groundwork for similar reforms statewide.

II. Introduction

Wildfires are endemic to California.[1] A growing population, increased construction in the wildland-urban interface (WUI), and climate change have made these fires more frequent and destructive.[2] While wildfires pose threats throughout the state, Northern and Southern California have vastly different ecosystems and thus require different strategies for managing fire risk.[3] Southern California has longstanding and effective fire suppression and response mechanisms, but most of the state's wildfire prevention strategies are geared towards addressing the types of fires that occur in Northern California—namely, those that occur in conifer forests. Preventing fires in Southern California, which are often wind-driven and occur in chaparral ecosystems, requires a different approach.

While state-level efforts have been largely devoted to wildfire suppression in the past, recent legislation is increasingly focused on prevention efforts, reflecting the expert consensus that protecting California's residents and habitats from wildfire requires taking prevention and mitigation just as seriously as suppression. From 1999-2017, 150 wildfire bills were proposed, and only 28 (18.7%) of those were chaptered and appropriated.[4] 16 out of 53 (30.2%) proposed wildfire bills were chaptered and appropriated during the 2017-2018 legislative session.[5] In the 2019-2020 legislative session, 22 bills focused on improving California's wildfire mitigation, preparedness, and response efforts, including those geared towards helping the state reach its

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[1] *See, e.g.*, Emily Han and Gregory Han, *To Combat Raging Wildfires, Cal. Turns to Native American Knowledge*, DWEL (Sept. 16, 2020), https://www.dwell.com/article/california-wildfire-indigenous-cultural-burning-213be8df; Lauren Sommer, *To Manage Wildfire, Cal. Looks to what Tribes Have Known All Along*, NAT'L PUB. RADIO (Aug. 24, 2020), https://www.npr.org/2020/08/24/899422710/to-manage-wildfire-california-looks-to-what-tribes-have-known-all-along.

[2] *Wildfires and Climate Change*, CTR. FOR CLIMATE AND ENERGY SOLUTIONS, https://www.c2es.org/content/wildfires-and-climate-change (last visited Nov. 23, 2020); *see also Wildland Urban Interface (WUI): Resources to Help Fire Dep'ts and Communities Prepare for and Respond to a WUI fire*, U.S. FIRE ADMIN., https://www.usfa.fema.gov/wui/ (last visited Nov. 23, 2020).

[3] *See* Pacific Southwest Research Station, *Fire in Chaparral Ecosystems*, U.S. FOREST SERVICE, https://www.fs.fed.us/psw/topics/fire_science/ecosystems/chaparral.shtml (last visited Nov. 23, 2020); *see also Southern California Chaparral Habitats: Climate Change Vulnerability Assessment Synthesis*, ECOADAPT, http://ecoadapt.org/data/documents/EcoAdapt_SoCalVASynthesis_Chaparral_FINAL2017.pdf (last visited Nov. 23, 2020) (describing chaparral ecosystems in Southern California and their vulnerability to climate change).

[4] Courtney A. Schultz, Sarah M. McCaffrey, & Heidi R. Huber-Stearns*Policy Barriers and Opportunities for Prescribed Fire Application in the Western United States*, INT'L J. OF WILDLAND FIRE 107 (2019).

[5] *Id.*

clean energy goals, were appropriated.[6] 11 of these bills were specifically focused on wildfire prevention measures.[7] This increase demonstrates a growing awareness of the threat that wildfires pose to the health and welfare of state residents and political will to act to prevent further destruction. Nonetheless, the state agency charged with wildfire management responsibilities, the Department of Forestry and Fire Protection (CalFire), remains primarily a suppression-oriented institution, and there is still a dearth of resources for prevention strategies relevant for Southern California.

Experts agree that prevention tools such as proper vegetation management, home hardening and defensible space inspections, improved risk mapping, increased fuel treatment, and community outreach and education can meaningfully reduce wildfire risk and will become increasingly important as more Southern California residents move into the WUI. This report explores the current challenges to implementing such effective wildfire prevention and mitigation strategies in Southern California, proposes solutions, and outlines areas where more targeted research is necessary. Specifically, Section III examines CalFire's suppression focus and the lack of a dedicated state agency to tackle prevention efforts; Section IV proposes a pilot program in Ventura County that could enhance current prevention and mitigation efforts and establish best practices for Southern California, and describes the type of prevention and mitigation work the pilot program would support; Section V discusses potential funding sources for the pilot program; and Section VI concludes our report.

III. Current Fire Prevention and Management Challenges

A. Lack of Statewide Agency Exclusively Devoted to Fire Prevention and Mitigation

CalFire is a state agency focused on emergency response and resource protection.[8] It responds to over 5,750 wildland fires each year, cooperates with federal, state, and local agencies on their fire response efforts, enforces state fire and forest laws, and manages timbers and fuels in California forests.[9] It also has Unit Fire Prevention Bureaus, which focus on engineering, vegetation management, prevention planning, education, and enforcement.[10] While CalFire is tasked with both wildfire suppression and prevention, historically, its primary focus has been suppression. Indeed, the agency spends approximately $75 million a year on prevention, which is just 4% of its total budget.[11]

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[6] *Governor Newsom Signs Bills to Enhance Wildfire Mitigation, Preparedness, and Response Efforts*, OFFICE OF GOVERNOR GAVIN NEWSOM (Oct. 2, 2019), https://www.gov.ca.gov/2019/10/02/governor-newsom-signs-bills-to-enhance-wildfire-mitigation-preparedness-and-response-efforts/.

[7] *Id.*

[8] *What is CAL FIRE?*, CAL FIRE, https://www.fire.ca.gov/media/4925/whatiscalfire.pdf (last visited Nov. 23, 2020).

[9] *Id.*

[10] *Id.*

[11] Liz Wagner, Robert Campos, & Michael Horn, *Cal Fire Says It's Focusing on Fire Prevention; But Critics Say Current Efforts Leave State Vulnerable to More Mega Fires*, NBC BAY AREA (Nov. 7, 2017, 11:49 PM) https://www.nbcbayarea.com/news/local/cal-fire-says-its-focusing-on-fire-prevention/37124.

With California's prolonged drought, extended fire seasons, and build-up of dry vegetation due to forest management policies focused on suppressing fire, the agency has been forced to focus more on prevention in recent years, but it continues to lack the workforce, knowledge, and culture to be most effective in this space.[12] Even though CalFire Director Ken Pimlott stated in a 2016 memo that the department would focus on prevention and fuel treatment when not training its staff to respond to fires,[13] the agency has fallen short on various prevention measures, like defensible space inspections and prescribed burning.[14] There are a number of reasons for this. First, funding for suppression work is more readily accessible. Indeed, U.S. Secretary of Agriculture Sonny Perdue has explained that because of the increase in destructive wildfires in recent years, the government ends up "having to hoard all of the money that is intended for fire prevention" because it fears it is "going to need it to actually fight fires."[15] Second, prevention work requires a completely different skill set than suppression.[16] To better approach prevention, the agency would have to both work with and hire more scientists that can investigate and determine the most effective prevention efforts and completely restructure its training program to ensure that the next generation of firefighters are just as equipped and passionate about prevention as they are about putting out fires.[17] Third, focusing more on prevention may mean that CalFire will expose itself to greater liability, requiring agency resources to defend against the resulting legal actions.[18]

B. Potential Benefits to a Separate Prevention-Focused State Agency

Because CalFire is well-positioned to execute wildfire suppression efforts, and because its current organizational structure and culture is not particularly well-equipped to emphasize prevention and mitigation efforts, some experts believe that the state should anchor its wildfire prevention work elsewhere. Among fire experts, there is much debate about what type of agency should be responsible for fire prevention, with some arguing for the creation of a new statewide wildfire prevention agency and others maintaining that regional and local management of prevention strategies would be a better fit.

There could be significant benefits attending the creation of a prevention-focused state agency. As fires become a more frequent and destructive part of the state's environment, an agency with the administrative power of the state would be well-suited for coordinating efforts for effective

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[12] *Id.*

[13] Memorandum from Ken Pimlott, CAL FIRE Director, to Region Chiefs et al., on Mandatory Fuels Reduction Targets and Activity Reporting (Sept. 27, 2016) https://www.documentcloud.org/documents/4176986-2016-Fuels-Reduction-Memo.html (on file with author).

[14] Memorandum from Ken Pimlott, CAL FIRE Director, to Region Chiefs et al., on Fiscal Year 2017-18 Mandatory Fuels Reduction Targets and Activity Reporting (July 21, 2017) https://www.documentcloud.org/documents/4176985-2017-Fuels-Reduction-Targes-and-Activity.html (on file with author).

[15] *Forest Service Wildland Fire Suppression Costs Exceed $2 Billion*, U.S. DEP'T OF AGRIC. (Sept. 14, 2017), https://www.usda.gov/media/press-releases/2017/09/14/forest-service-wildland-fire-suppression-costs-exceed-2-billion.

[16] *See* Liz Wagner, Robert Campos, & Michael Horn, *Cal Fire Says It's Focusing on Fire Prevention; But Critics Say Current Efforts Leave State Vulnerable to More Mega Fires*, NBC BAY AREA (Nov. 7, 2017, 11:49 PM) https://www.nbcbayarea.com/news/local/cal-fire-says-its-focusing-on-fire-prevention/37124.

[17] *Id.*

[18] *Id.*

prevention, especially since fires do not respect municipal or county boundaries. At least one expert has proposed that such an agency could have one main office with satellite offices in different regions throughout the state, each of which would focus on the fire prevention strategies that are most effective in that area.[19] This approach would centralize planning and funding in one body, allowing for effective deployment of resources, but would also support prevention efforts appropriately tailored to the unique environmental circumstances in different areas of the state.

However, the process to create such an agency would by no means be quick or easy. Such an agency would most likely be created by legislative enactment.[20] Given entrenched political interests in the wildfire space, among them the CalFire union, insurance interests, property owners and realtors, and others, such legislation would likely be the result of significant effort and compromise, and could take multiple years to negotiate.

The process of converting the California Department of Oil, Gas, and Geothermal Resources (DOGGR) to the California Geologic Energy Management Division (CalGEM) provides a useful illustration of the challenge in defining a new role for a state agency. DOGGR was established in 1915 by the California Legislature to regulate oil and gas activities in the state.[21] Although certain of DOGGR's policies and practices had attracted scrutiny for decades, efforts to improve oversight, address management issues, and reorient the agency's focus away from fossil fuel production in keeping with the State's shift towards clean energy were met with strong opposition.[22] After years of debate about DOGGR's structure and role,[23] in 2019, the Legislature passed AB 1057, renaming the agency CalGEM and requiring it to prioritize protecting public health, safety, and environmental quality, including by reducing greenhouse gases associated with hydrocarbon development.[24] This was the first time oil and gas producers in the state were tasked with reducing greenhouse gas emissions related to their activities.[25]

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[19] Michael Wara, *Op-Ed: Concrete Steps California Can Take to Prevent Massive Fire Devastation*, L.A. TIMES (Sept. 16, 2020, 10:21 AM), https://www.latimes.com/opinion/story/2020-09-17/california-state-agency-fire-preparedness.

[20] *Legislative Process*, CALIFORNIA STATE SENATE, https://www.senate.ca.gov/legislativeprocess (last accessed Nov. 23, 2020).

[21] IDLE WELL PROGRAM REPORT: ON IDLE & LONG-TERM IDLE WELLS IN CAL., CAL. DEP'T OF CONSERVATION 4 (Dec. 13, 2018), https://www.conservation.ca.gov/calgem/idle_well/Documents/AB-2729-Idle-Well-Program-Report.pdf.

[22] Bill Allayaud, *Who's Watching the Oil and Gas Industry in Cal.?*, EWG (May 8, 2017) https://www.ewg.org/enviroblog/2017/05/whos-watching-oil-and-gas-industry-california; *see also* Ann Alexander, *Time to Bring CA Oil Drilling Law into 21st Century*, NRDC (Feb. 26, 2019), https://www.nrdc.org/experts/ann-alexander/time-bring-california-oil-drilling-law-21st-cent (describing the history of DOGGR).

[23] Evan Symon, *Governor Newsom Adds New Oil and Natural Gas Extraction Regulations*, CAL. GLOBE (Nov. 20, 2019, 3:08 PM), https://californiaglobe.com/section-2/governor-newsom-adds-new-oil-and-natural-gas-extraction-regulations.

[24] Assem. Bill 1057, 2019-2020 Reg. Sess. (Cal. 2019), *available at* http://leginfo.legislature.ca.gov/faces/billTextClient.xhtml?bill_id=201920200AB1057.

[25] *See* John Cox, *Gavin Newsom Reforms Oil Standards With Regulatory* Changes, Appointment, BAKERSFIELD (Oct. 14, 2019), https://www.bakersfield.com/news/gavin-newsom-reforms-oil-standards-with-regulatory-changes-appointments/article_d2fefe8e-eea8-11e9-9e33-83577d5aba23.html.

While the DOGGR-to-CalGEM saga is not a perfect analog, the process to create a new state wildfire prevention agency would likely involve similar challenges. CalFire currently holds responsibility for undertaking wildfire prevention efforts that are orchestrated at the state level, and the CalFire union is likely to oppose any proposal that seeks to remove fire-related work from CalFire's control.[26] Some members of the Legislature may not see the merits of creating an agency from scratch when CalFire already exists, has a significant presence throughout the state as a trusted fire management agency, and has strong political influence. And other interest groups, like property owners, the insurance industry, and environmentalists are all likely to have concerns and positions regarding the ways in which a new prevention-focused agency should operate.

Because of the challenges inherent in the process of creating a new state agency, some wildfire experts believe that rather than creating a new agency, existing state, regional, and local agencies could effectively develop a prevention and suppression focus if given the proper resources and funding. And still others believe that while a new state agency may be the ideal mechanism to manage enhanced prevention efforts, because the process to create such an agency would be long and arduous, short-term prevention work needs to move forward at the regional level within agencies that currently exist, with an eye towards creating a state agency when the political will, funding, and capacity develops to make that possible. While we acknowledge that a state-level wildfire prevention agency could be effective, we have chosen to focus on efforts at the regional level as an important, and necessary, short-term step to address wildfire risk.

IV. A Regional Strategy to Enhance Wildfire Prevention in Southern California: The Ventura County Fire Prevention Pilot Program (FPPP)

As work continues on the evolving concept of a state-level wildfire prevention agency, simultaneous prevention efforts will continue to be necessary at the regional and local level. Based on our conversations with experts, a county-level program designed to enhance home hardening and defensible space inspections, improve risk mapping, and augment community outreach and education would have demonstrable benefits. In Southern California specifically, a defined county-level prevention program would be able to address conditions particular to the chaparral ecosystems that have been impacted by a number of recent wildfires.

Ventura County's unique characteristics make it an ideal proving ground for a county-level wildfire prevention program. Ventura County has uniform and well-established fire services, just under 1 million residents,[27] and a diverse topography that requires different types of fire

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[26] For example, the Cal Fire Union (Local 2881) opposed AB 2147, a bill that would make it easier for inmate firefighters to have their records expunged upon release. Ryan Sabalow, *CA Bill Could Help Inmate FFs Find Future in Fire Service*, FIREHOUSE (Jul. 23, 2020), https://www.firehouse.com/operations-training/wildland/news/21147461/ca-bill-could-help-inmate-firefighters-find-future-in-fire-service. The Union also actively pursues litigation to protect its members rights. *See, e.g.*, Curt Varone, *Cal Fire Local Sues to Ensure Seasonal Firefighters are Protected by the Firefighter Procedural Bill of Rights*, FIRE LAW BLOG (Feb. 20, 2020), http://www.firelawblog.com/2020/02/20/cal-fire-local-sues-to-ensure-seasonal-firefighters-are-protected-by-the-firefighter-procedural-bill-of-rights/.

[27] *Quickfacts: Ventura Cnty., CA*, U.S. CENSUS BUREAU, https://www.census.gov/quickfacts/fact/table/venturacountycalifornia/PST045219 (last visited Nov. 23, 2020).

prevention approaches.[28] While it already has many effective fire prevention services in place, there are key areas in which an infusion of resources could both helpfully expand current operating capacity and allow for new efforts to enhance community engagement and physical risk mitigation.[29] In this section, we lay out our proposal to create a Fire Prevention Pilot Program (FPPP) in Ventura County, explain the rationale for each of the FPPP's component parts, discuss potential funding sources for the program, and explain how the FPPP might interact with pilot efforts currently being undertaken by the California Fire Safe Councils.

While Ventura County does devote resources to prevention and mitigation efforts at present, there is no centralized program on the County level designed to implement a set of best practices in the prevention and mitigation space.[30] The FPPP, which would be managed by the Ventura County Board of Supervisors, would fill that role, earmarking funds specifically to undertake a defined set of prevention-related priorities. To ensure that FPPP funding is appropriately utilized, the County would be obligated to use a documentation and reporting mechanism to track the program's efficacy over time. Funds would be distributed to relevant County agencies by the Board of Supervisors, with the requirement that they be utilized for:

- ***Community-oriented home hardening and defensible space.*** Implementing home hardening and defensible space requirements on a community level, rather than a home-by-home basis, can augment the effectiveness of these measures by increasing the "herd immunity" of a neighborhood against fire risk. FPPP funds would be used to educate entire communities about appropriate home hardening and defensible space measures, improve access to vegetation management and fire-resilient planting resources for indigent property owners, and partner with community organizations to support home hardening improvements.

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[28] *See* CNTY. OF VENTURA, https://www.ventura.org/county-executive-office/about-us/ (last visited Nov. 23, 2020).

[29] LA County would be less optimal for a pilot program for a number of reasons. First, it is significantly larger than Ventura County, making it difficult for the limited amount of funding available for a pilot program to have as tangible of an impact over the pilot program period. *Quickfacts: LA Cnty., CA*, U.S. CENSUS BUREAU, https://www.census.gov/quickfacts/losangelescountycalifornia (last visited Nov. 23, 2020). Second, it is a contract County—some cities in the County have their own fire departments, while others do not and receive fire services directly from the County fire department. *Consolidated Fire Protection District of L.A. Cnty.*, CNTY. OF L.A. FIRE DEP'T, https://fire.lacounty.gov/contracting/ (last visited Nov. 23, 2020). This means it would be much harder to implement a county-wide program in a uniform manner, especially at the pilot program stage.

[30] The California Fire Safe Council will implement a Regional Coordinator pilot program in 2021-2022 funded by a state block grant. This program seeks to hire three individuals to work in the Coastal, Southern, and Sierra-Cascade regions of the state to help support local Fire Safe Councils and wildfire practitioners, increase community programming, and sustain a statewide network of leaders working in the fire prevention space to enhance the resilience of California's priority watersheds. *See Join Our Team!*, CAL. FIRE SAFE COUNCIL (Jul. 2, 2019), see also https://cafiresafecouncil.org/join-our-team; *see also* CHEGG INTERNSHIPS, https://www.internships.com/posting/bug_38845252145 (last visited Nov. 23, 2020).
While the Regional Coordinator Program provides support for improving fire prevention coordination efforts generally, Regional Coordinators will have significant discretion to direct spending of allocated funds; the FPPP would create a funding stream dedicated to specific fire prevention strategies—namely, improving home hardening and vegetation management, increasing risk mapping, and increasing outreach and educational programming. Upon completion of both the Regional Coordinator pilot program and the FPPP, experts could identify key takeaways and model scaled-up versions of these programs based on the best practices identified by both.

- ***Improved risk mapping.*** Improving hazard mapping involves creating maps that highlight hazardous areas on a "micro-area" scale, or on the level of individual neighborhoods or even homes, rather than the current system of assigning hazard designations to large areas of land. While Ventura County's Geographic Information System (GIS) mapping system is an effective informational tool for property owners, helping them understand the risk overlays for their own properties, a more detailed understanding of topographical, geophysical, and vegetation conditions could help homeowners and firefighters tailor home hardening and defensible space requirements on a neighborhood-by-neighborhood basis. It could also inform evacuation plans and emergency measures. FPPP funds would be used to implement state-of-the-art hazard mapping technologies that have been deployed with success in other California jurisdictions to enhance neighborhood emergency preparedness.

- ***Fuel treatment strategies and reforms.*** Numerous fuel treatment methods are available and utilized in Ventura County, and the ease and frequency of use for all methods could be increased. Making better use of community resources can scale up less technical and lower-risk thinning, such as pruning and brush collection. Key reforms to the prescribed burning process could facilitate its use for the public benefit. FPPP funds would be used to educate the community about various fuel treatment techniques and the circumstances under which they are most effectively deployed and to supplement current County resources devoted to fuel treatment. FPPP funds could also, if desired, be used to study the efficacy of prescribed burning in ecosystems common to Ventura County, implement reforms to the burn authorization process at the air district level, and/or train community groups in appropriate and safe burn management techniques.

- ***Enhanced community education and outreach.*** By expanding the type of educational resources it offers, such as increasing the availability of interactive teaching tools, and teaming up with community groups to improve the accessibility of the available resources, Ventura County can build upon its existing community outreach efforts to more effectively engage whole neighborhoods in the project of mitigating wildfire risk. FPPP funds would be used to fund enhanced community education efforts modeled on best practices that have been found to be effective in other jurisdictions, including in Oregon and Colorado.

Below, we discuss in greater detail each component of the FPPP.

A. Community-Oriented Home Hardening and Defensible Space

While wildfires will always pose a risk, Ventura County residents can reduce the chances of their houses igniting during a wildfire by hardening their homes and creating defensible space. Common home hardening measures include replacing roofs with ignition-resistant and noncombustible materials, installing thicker-paned windows to prevent breakage, and enclosing

rain gutters to prevent the accumulation of ignitable plant debris.[31] Defensible space is a fire-resistant buffer created around a house to separate it from surrounding vegetation. By reducing the amount of flammable material around a structure—usually within a 100 or 200 feet radius—defensible space helps prevent a home from igniting due to contact with burning vegetation or from the radiant heat.[32] By implementing and maintaining these prevention strategies, property owners can reduce the chance that their homes will ignite during a fire even after they have evacuated and cannot directly protect their homes.

1. Home Hardening

Data from some of California's most devastating recent fires indicates that home hardening undertaken in compliance with updated 2008 California Building Code requirements can decrease a home's chance of catching fire, which in turn reduces the possibility of igniting neighboring homes. In the 2018 Camp Fire, the town of Paradise suffered both significant loss of life and structure loss. Single-family homes built according to the 2008 Building Code requirements, which significantly strengthened home hardening mandates for homes built in the WUI,[33] had a 51% chance of surviving the Camp Fire, while those built before the Building Code changes had an 18% chance.[34] Similarly, many of the homes destroyed during the 2017 Thomas Fire were built before the 2008 Building Code update.[35]

However, there are hurdles to the adoption and effectiveness of home hardening standards. First, pre-existing structures are not required to make modifications to conform to updated Building Code standards, so many homes in the WUI are not retrofit to meet California's more recent protective requirements.[36] Homeowners in the WUI may face financial barriers to retrofitting their structures,[37] may be unaware of the need to retrofit, or may simply be unwilling to make the

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[31] *Hardening Your Home*, CAL. DEP'T OF FORESTRY & FIRE PROTECTION (2019), https://www.readyforwildfire.org/prepare-for-wildfire/get-ready/hardening-your-home.

[32] *Maintain Defensible Space*, CAL. DEP'T OF FORESTRY & FIRE PROTECTION (2019), https://www.readyforwildfire.org/prepare-for-wildfire/get-ready/defensible-space/

[33] California changed its building code in 2008 to improve the fire resistance of homes in high-risk areas in the WUI, creating requirements related to ember-proof roofing, siding materials, and other such safeguards. Cal. Code Regs., tit. 24, pt. 2, §§ 701A to 710A (2007), https://archive.org/details/gov.ca.bsc.title24.part02.vol02/page/n23/mode/2up.

[34] Dale Kasler & Phillip Reese, *"The weakest link": Why Your House May Burn While your Neighbor's Survives the Next Wildfire*, SACRAMENTO BEE, (April 11, 2019), https://www.sacbee.com/news/california/fires/article227665284.html. In addition, fewer than 3% of the homes in Paradise were built after 2008.

[35] Emily Guerin, *Fire-Resistant is Not Fire-Proof, California Homeowners Discover*, NATIONAL PUBLIC RADIO (December 9, 2018), https://www.npr.org/2018/12/09/673890767/fire-resistant-is-not-fire-proof-california-homeowners-discover.

[36] *Building Codes Toolkit, Frequently Asked Questions*, FEDERAL EMERGENCY MANAGEMENT AGENCY, 2, https://www.fema.gov/media-library-data/1391095848112-ea8765dee99538f4bb2cc7179cf5c175/Building_Codes_Toolkit_FAQ_508.pdf; Dale Kasler & Phillip Reese, *"The weakest link": Why your house may burn while your neighbor's survives the next wildfire*, SACRAMENTO BEE, (April 11, 2019) (only 860,000 homes and apartments have been built statewide since the 2008 code changes went into effect, which constitutes about 6% of the state's housing stock).

[37] Roof replacement can cost anywhere from $200-$1,800 per 100 square feet depending on the materials used. *Ventura Roofing Costs & Prices*, PROMATCHER, https://roofing.promatcher.com/cost/ventura-ca-roofing-costs-prices.aspx (accessed November 24, 2020).

investment of time and money. Second, home hardening and defensible space requirements are largely enforced on a home-by-home basis, but evidence suggests that, due to the incredibly high temperatures at which home fires burn, burning houses often ignite their neighbors.[38] Even if a single home follows all home hardening requirements and best practices, that may not be enough to protect it from wildfire if it is surrounded by noncompliant neighbors—or potentially even one noncompliant house.

Experts agree that home hardening is most effective when deployed at a neighborhood level, as opposed to by individual homeowners. Currently, Ventura County does not have a community-oriented and neighborhood-based approach to home hardening; as is typical in California, home hardening requirements are enforced individually, and there is no guarantee that all homes in a neighborhood will be compliant. To increase the "herd immunity" of neighborhoods by retrofitting structures that do not meet current home hardening standards, we propose utilizing FPPP funding to both increase community awareness of the need for home hardening retrofits and to establish a source of available financial support for indigent property owners who may otherwise lack the resources to retrofit their properties. The County could also consider directing some funds to a home hardening matching program, with the County matching homeowner contributions towards a home hardening retrofit, and could partner with, or encourage community partnerships with, existing organizations that undertake home hardening improvements, like Habitat for Humanity.[39]

2. Defensible Space

Compliance with home hardening requirements alone is not a guarantee that a structure will survive a wildfire.[40] Defensible space measures can also be effective wildfire risk mitigation tools and, as in the home hardening context, community-wide approaches can increase the efficacy of defensible space. Ventura's Fire Hazard Reduction Program (FHRP) requires property owners in the WUI to manage hazards and nuisance vegetation year-round in order to reduce the amount of dry or poorly maintained vegetation that serves as fuel for wildfires. While

[38] Cotton K. Randall, *Fire in the Wildland-Urban Interface: Understanding Fire Behavior*, UNIVERSITY OF FLORIDA, INSTITUTE OF FOOD AND AGRICULTURAL SCIENCES (IFAS) AND THE USDA FOREST SERVICE, 8, 3, https://www.srs.fs.usda.gov/factsheet/pdf/fire-understanding.pdf (buildings are heavy fuels): *Home Fire Facts,* CITY AND COUNTY OF SAN FRANCISCO FIRE DEP'T, https://sf-fire.org/home-fire-facts#:~:text=In%20only%203%201%2F2,the%20people%20in%20those%20rooms (a house can reach 1100 degrees Fahrenheit in less than five minutes). *How Homes Ignite*, FIRE SAFE MARIN, https://www.firesafemarin.org/how-homes-ignite ((home-to-home ignition of fires during wildfire events become more significant than direct flame contact).

[39] A partnership currently exists between Habitat for Humanity and the Climate Action Corps to perform low-cost retrofits for low-income homes in fire prone communities, including Ventura County. FPPP funding could be directed towards this partnership to expand its capacity in Ventura County; property owners could be made aware of this resource on the County's website, through community outreach, and through the annual hazard abatement notices distributed by the County.

[40] For example, homes in one area of the Ventura Foothills were built in 2016 in accordance with the most recent Building Code requirements, yet four out of nine homes burned down in the 2017 Thomas Fire. Emily Guerin, *Fire-Resistant is not Fire-Proof, California Homeowners Discover*, NATIONAL PUBLIC RADIO (December 9, 2018), https://www.npr.org/2018/12/09/673890767/fire-resistant-is-not-fire-proof-california-homeowners-discover.

some Homeowners Associations take responsibility to manage brush clearance, Ventura County Fire is required by California law to send the "Abatement Notice" to the actual property owner.[41] Common requirements are 100 feet of vegetation clearance from structures and 10 feet for road access.[42] The FHRP also covers management of "defensible space and fuel medication zones" mandated by state law and the Ventura County Fire Code.[43] These provisions dictate general requirements for the installation, maintenance, and spacing of vegetation on properties in high risk areas, and apply to properties located within a State Responsibility Area, a Very High Fire Severity Zone in the Local Reasonability Area, a Hazardous Fire Area, and or any other property that the fire department deems necessary to be included.[44] These standards use CalFire's determinations of State Responsibility Areas and Very High Fire Severity Zones in Local Reasonability Areas.[45]

As with home hardening, the common practice is to inspect compliance with defensible space requirements on a property-by-property basis. However, due to their fast-growing nature, certain flammable plants from a noncompliant property—such as mustard weed—can spread onto a property that has created the recommended amount of defensible space.[46] Implementing community-level defensible space measures would increase overall compliance and reduce the amount of uncontrolled brush surrounding a community, thus increasing a neighborhood's chance of survivability. Community-based approaches could also have the benefit of promoting more holistic vegetation management strategies, like removal of invasive species and replanting with fire-resistant native flora, on a community scale.

In Ventura County, inspections are conducted annually to determine compliance with brush clearance requirements under the FHRP.[47] Property owners included in the FHRP receive annual notices, issued around April 20 of each year, with requirements for abating fire hazards. Parcel inspections begin the last week of May, and the Annual Fire Hazard Clearance deadline is June 1.[48] Properties that do not complete their required clearance are subject to abatement by the Fire District—meaning that County officers will come onto the property to clear the nuisance for the

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[41] *Guideline 411: FHRP Frequently Asked Questions*, VENTURA COUNTY FIRE DEP'T (February 5, 2020), https://vcfd.org/wp-content/uploads/2020/02/411-FHRP-Frequently-Asked-Questions.pdf.
[42] *Guideline 411: FHRP Frequently Asked Questions*, VENTURA COUNTY FIRE DEP'T (February 5, 2020), https://vcfd.org/wp-content/uploads/2020/02/411-FHRP-Frequently-Asked-Questions.pdf.
[43] Public Resource Code 4291, Government Code 51182, Ventura County Fire Code Standard 515.
[44] *Standard 515 Defensible Space and Fuel Modification Zones*, VENTURA COUNTY FIRE DEP'T (November 20, 2020). https://vcfd.org/wp-content/uploads/2020/02/515-Defensible-Space-and-Fuel-Modification-Zones-Standard.pdf.
[45] *Id.*
[46] Javier Panzar, *This Super Bloom is Pretty Dangerous: Invasive Mustard is Fuel for the Next Fire*, LA TIMES (April 25, 2019), https://www.latimes.com/local/lanow/la-me-ln-mustard-fire-santa-monica-mountains-20190425-story.html (*Brassica nigra*, better known as black mustard, "takes advantage of natural habitats that are constantly disturbed — either by fire or by the creation and maintenance of roads.").
[47] *Appendix W: Fire Hazard Reduction and Vegetation Management*, VENTURA COUNTY FIRE DEP'T (January 1, 2020), https://vcfd.org/wp-content/uploads/2020/02/Ord-31-Appendix-W-Excerpt-Fire-Hazard-Reduction-and-Vegetation-Management.pdf.
[48] *Guideline 411: FHRP Frequently Asked Questions*, VENTURA COUNTY FIRE DEP'T (February 5, 2020), https://vcfd.org/wp-content/uploads/2020/02/411-FHRP-Frequently-Asked-Questions.pdf.

property owner.[49] Non-complying property owners must pay all abatement costs and fees; non-payment results in a lien on the property.[50]

While Ventura County's FHRP has been effective, there is room for the FPPP to augment this existing program. First, FPPP funding could expand the capacity of the FHRP to allow for more frequent and thorough investigations. As fires become prevalent year-round, communities would benefit from inspections throughout the year to ensure that properties are compliant.[51] Inspection loads are also increasing as development expands into the WUI, meaning that the number of firefighters needed to conduct inspections will continue to grow over time.[52] FPPP funds could supplement County resources already devoted to the FHRP to maximize its efficacy.

Second, the FPPP could provide resources that would enable Ventura County to engage in community-oriented vegetation management efforts. While Ventura County has an existing reporting system designed to allow residents to hold neighbors accountable for fire hazard abatement by creating an expedited process to declare non-compliant properties public nuisances,[53] the County offers few programs designed to engage neighborhoods and/or community organizations in affirmative vegetation management planning and education. FPPP funds could enhance the County's capacity to engage in outreach to community groups and could assist neighborhood-level organizations with the capacity and training to design vegetation management plans. Such plans could go beyond more temporary vegetation management strategies, like cutting back dried brush, to include neighborhood-level commitments to permanently remove flammable invasive plants and replant or encourage the natural growth of native fire-resistant plants.

Third, some property owners may lack the financial resources to properly manage vegetation. For example, the removal of a single tree in Ventura is estimated to cost between $500-$600.[54] At present, the expedited nuisance system results in County-administered vegetation management on such properties, with a lien attaching in the case of non-payment for such

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[49] *Guideline 403: FHRP Abatement Assessment and Appeal*, VENTURA COUNTY FIRE DEP'T (January 1, 2020), https://vcfd.org/wp-content/uploads/2020/02/403-FHRP-Abatement-Assessment-and-Appeal-Process-Guideline.pdf.

[50] *Appendix W: Fire Hazard Reduction and Vegetation Management*, VENTURA CNTY FIRE DEP'T (January 1, 2020), https://vcfd.org/wp-content/uploads/2020/02/Ord-31-Appendix-W-Excerpt-Fire-Hazard-Reduction-and-Vegetation-Management.pdf.

[51] *Emergency Preparedness Guide*, READY VENTURA COUNTY, 25, 17, http://vcportal.ventura.org/vcfd/docs/VC_EPG.pdf ("wildfires are now a year-round reality in Ventura County.").

[52] *Most California Fires Occur in Area of Wildland-urban Interface with Less Fuel and More People*, UNITED STATES DEP'T OF AGRICULTURE FOREST SERVICE (September 24, 2019), https://www.nrs.fs.fed.us/news/release/wui-interface-intermix; Volker C. Radeloff et. al, *Rapid Growth of the US Wildland-Urban Interface Raises Wildfire Risk*, PROCEEDINGS OF THE NATIONAL ACADEMY OF SCIENCES OF THE US (March 27, 2018), https://www.pnas.org/content/115/13/3314.

[53] Ventura has a special ordinance that expedites the procedure for declaring a property located in a fire hazard zone a public nuisance if it fails to abide by defensible space and vegetation management requirements. This ordinance eliminates the hearing and appeal processes that standard public nuisance ordinances require, helping properties come into compliance much more quickly than would otherwise be possible under standard ordinances. *Fire Hazard Reduction Program (FHRP)*, VENTURA CNTY FIRE DEP'T., https://vcfd.org/fire-prevention/fire-hazard-reduction-program-fhrp (last visited Nov. 23, 2020).

[54] *Ventura Tree Trimming or Removal Costs & Prices*, PROMATCHER, https://trees.promatcher.com/cost/ventura-ca-trees-costs-prices.aspx (accessed November 2020).

services.[55] To reduce equity concerns that may be associated with this system, under limited circumstances, FPPP funds could be made available to under-resourced property owners for vegetation management purposes.

Finally, as discussed in greater detail below, the FPPP could fund more detailed risk mapping efforts that would help the County and local communities to understand which strategies would be most effective to manage defensible space in particular geographic areas.

B. Improved Risk Mapping

As discussed above, defensible space requirements are often assigned according to broadly designated risk zones that span large swaths of area. This method does not take into account differences in risk factors like plant density, minor terrain changes, and construction trends on a granular level.[56] An alternative, more precise method of determining how much defensible space is effective in a particular location could be based on data gathered during brush clearance inspections and an improved system of hazard mapping that takes into account neighborhood-specific characteristics that change the degree of risk.

Improving risk and hazard mapping can provide an important tool for properly managing community-based defensible space measures. Currently, California uses Fire Hazard Severity Zone Maps to indicate which areas and communities are most at-risk for wildfires.[57] CalFire is required by law to map areas of significant fire hazards based on factors like fuels, terrain, and weather.[58] It uses a scale of moderate, high, and very high when determining hazard level; local agencies may also adopt their own risk-based designations.[59]

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[55] *Guideline 403 FHRP Abatement Assessment and Appeal*, VENTURA CNTY FIRE DEP'T (January 1, 2020), https://vcfd.org/wp-content/uploads/2020/02/403-FHRP-Abatement-Assessment-and-Appeal-Process-Guideline.pdf.

[56] The Ventura County Community Wildfire Protection Plan is a publicly available document containing wildfire hazard maps. The Plan has not been updated for a decade, and the included maps have not been updated since 2009. *Ventura County Community Wildfire Protection Plan*, VENTURA CNTY FIRE DEPT, prepared by the Ojai Valley Fire Safe Council, 67, 9, 17 (2010), https://vcfd.org/wp-content/uploads/2020/02/VCCommunityWildfireProtectionPlan.pdf. See also Keane et al., *A Method for Mapping Fire Hazard and Risk Across Multiple Scales and its Application in Fire Management*, USDA Forest Service, 63, 7 (May 2008), https://www.firescience.gov/projects/05-1-1-12/project/05-1-1-12_jfsp_final_fireharm_text.pdf ("Most fire hazard efforts tend to concentrate on stand-level fuels and their characteristics without recognizing the spatial influence of topography, winds, and adjacent fuels… The spatial characteristics of landscape composition and structure is important to estimates of fire hazard as the pattern of fuels will ultimately influence fire spread and subsequent fire intensity" and "…spatial fuel patterns will ultimately dictate the design and placement of fuel treatments on the landscape.").

[57] *Fact Sheet: California's Fire Hazard Severity Zones*, CAL DEP'T OF FORESTRY AND FIRE PROTECTION (May 2007), https://www.sccgov.org/sites/dpd/DocsForms/Documents/Fire_Hazard_Zone_Fact_Sheet.pdf.

[58] Cal. Govt. Code 51175-89.

[59] Hazard level is not risk level. *Fact Sheet: California's Fire Hazard Severity Zones*, CAL DEP'T OF FORESTRY AND FIRE PROTECTION (May 2007), https://www.sccgov.org/sites/dpd/DocsForms/Documents/Fire_Hazard_Zone_Fact_Sheet.pdf ("'Hazard' is based on the physical conditions that give a likelihood that an area will burn over a 30 to 50-year period without considering modifications such as fuel reduction efforts. 'Risk' is the potential damage a fire can do to the area under existing conditions, including any modifications such as defensible space, irrigation and sprinklers, and ignition resistant building construction which can reduce fire risk. Risk considers the susceptibility of what is being protected.").

Experts agree that the current risk mapping systems can be improved.[60] Ventura County's publicly available hazard maps have not been updated in over a decade.[61] But the degree of risk in a particular area can change on a much shorter timeframe than that, due to factors including climate change, the effects of recent wildfires themselves, and short-term weather conditions. A particularly wet winter, for example, can lead to a major increase in the amount of combustible plant species and corresponding fire risk during the dry season.[62] In addition, current maps are not specific enough to allow for a community-by-community assessment of defensible space requirements. While scientific data underpins the maps' risk-based determinations, those designations are typically applied to "macro-areas" that span multiple square miles and do not take into account more localized differences in topography and vegetation. For instance, a Ventura Foothills neighborhood where four out of nine homes burned down in the 2017 Thomas Fire was built in a narrow valley.[63] This topography may have acted as a wind tunnel that funneled embers from the wildfire into the neighborhood, a risk factor that was not properly reflected in the existing macro-area hazard maps.

More specific neighborhood-by-neighborhood risk mapping would help Ventura County to tailor defensible space requirements and vegetation management planning, and it could also bolster emergency planning efforts. For instance, in the Moraga-Orinda Fire District in Northern California, the fire department is working with local technology companies to develop a fire detecting system using low-Earth satellites.[64] While this technology is being developed to detect ancient fires, similar low-Earth satellites could potentially be used to gather data for more specific and detailed hazard mapping. The Colorado Springs Fire Department uses GIS mapping to delineate fire risk on a home-by-home basis.[65] Each parcel of land is color coded according to a hazard rating system from low to extreme. This kind of concrete data justifying defensible

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[60] Citygate Associates, *After Action Review of the Woolsey Fire Incident*, CNTY OF LA, 108, 98 (Nov 17, 2019), https://lacounty.gov/wp-content/uploads/Citygate-After-Action-Review-of-the-Woolsey-Fire-Incident-11-17-19.pdf.

[61] *Ventura County Community Wildfire Protection Plan*, VENTURA COUNTY FIRE DEPARTMENT, prepared by the Ojai Valley Fire Safe Council, 67, 9, 17 (2010), https://vcfd.org/wp-content/uploads/2020/02/VCCommunityWildfireProtectionPlan.pdf. By contrast, the Colorado Springs Fire Department's Mitigation Section consistently updates the its Wildfire Hazard Risk Assessment tool, which shows the risk ratings for different areas from low to extreme. Property owners using this system can access their risk ratings online at any time and compare them to those of their neighbors. The risk information in Colorado Springs is updated as property owners make modifications or upgrades.

[62] Eric Holst, *With all the snow and rain this year, California could face an even worse fire season. Here's why*. ENVIRONMENTAL DEFENSE FUND (April 29, 2019), https://www.edf.org/blog/2019/04/29/all-snow-and-rain-year-california-could-face-even-worse-fire-season-heres-why#:~:text=Historically%2C%20a%20wet%20winter%20in,to%20temper%20fire%20seasons%20here.; see also Eugene R. Wahl et. al, *Jet stream dynamics, hydroclimate, and fire in California from 1600 CE to present*, PROCEEDINGS OF THE NATIONAL ACADEMY OF SCIENCES OF THE US (March 19, 2019) https://www.pnas.org/content/116/12/5393.

[63] Emily Guerin, *Fire-Resistant is Not Fire-Proof, California Homeowners Discover*, NATIONAL PUBLIC RADIO (December 9, 2018), https://www.npr.org/2018/12/09/673890767/fire-resistant-is-not-fire-proof-california-homeowners-discover.

[64] Adele Peters, *This California Fire Chief is Building a Satellite System to Detect Wildfires as Soon as they Start*, FAST COMPANY (Sep 16, 2020), https://www.fastcompany.com/90550691/this-california-fire-chief-is-building-a-satellite-system-to-detect-wildfires-as-soon-as-they-start.

[65] Wildfire Risk Assessment Site, COLORADO SPRINGS FIRE DEPARTMENT, https://gis.coloradosprings.gov/Html5Viewer/?viewer=wildfiremitigation.

space requirements in specific neighborhoods may reduce noncompliance and promote the safety of the neighborhood as a whole.

Drawing on innovative risk mapping solutions that have been deployed on a limited basis in other jurisdictions, FPPP funding could be used to explore public sector-private sector partnerships to develop and deploy detailed risk mapping technology in Ventura County. There is a strong precedent for such partnerships in the wildfire management space. California has undertaken considerable efforts to modernize its wildfire management approach through partnership with the private sector and the state's public universities.[66] Some of these efforts have resulted from Governor Newsom's executive order establishing the Wildfire Innovation Sprint.[67] The order was designed to jump-start adoption of technological innovations by state agencies. The initiative has already led to important private sector contracts.[68] Meanwhile, university-run research labs, such as UC San Diego's WIFIRE,[69] help generate wildfire burn models that can be fed into statewide warning systems. Universities are invested in other efforts as well; for instance, UC San Diego operates the ALERT Wildfire system with the University of Nevada and the University of Oregon, a network of almost 300 high-definition cameras trained on high-fire-threat areas.[70] Ventura County is one of many sites in which these cameras have been installed.[71] Increased interest in the initiative has generated events such as spring 2019's inaugural Wildfire Technology Innovation Summit.[72]

Beyond the market incentives to develop such technology, Governor Newsom has budgeted about $1 billion in new funding for fire preparedness and response,[73] but local jurisdictions have helped lead the effort of forging relationships between fire districts and technological innovators.[74] A pilot program like the FPPP might invite new partnerships and fire control systems, and may be the ideal place to test technology not yet ready to be rolled out on a larger scale. Such partnerships could be facilitated by a designated a County official who would manage available innovation and partnership funding, seek out grant money, and determine the most promising initiatives to improve the County's wildfire prevention and mitigation strategies.

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[66] Julia Cart, *CA Pursues a Holy Grail: High-Tech Data to Predict How Wildfire Will Spread*, CAL MATTERS (Oct 23, 2019), https://calmatters.org/environment/2019/10/california-wildfire-response-plan-new-technology.

[67] Executive Order N-04-19, EXECUTIVE DEPT. STATE OF CA, https://www.gov.ca.gov/wp-content/uploads/2019/01/1.8.19-EO-N-04-19.pdf.

[68] *Governor Newsom Announces Two Innovative Contracts for Wildfire Prevention and Response*, CA OFFICE OF GOVERNOR (Sep 18, 2019), https://www.gov.ca.gov/2019/09/18/governor-newsom-announces-two-innovative-contracts-for-wildfire-prevention-and-response/

[69] WIFIRE: WORKFLOWS INTEGRATING COLLABORATIVE HAZARD SCIENCES, https://wifire.ucsd.edu.

[70] Mario Aguilera, *New Technology Helps Monitor Fire Hazards in Southern California*, UCSD AND SCRIPPS INST' OF OCEANOGRAPHY (Mar 31, 2016), https://scripps.ucsd.edu/news/new-technology-helps-monitor-fire-hazards-southern-california.

[71] Lauren Wood, Seventy High-Tech Cameras Installed in Southern California Provide Eyes on Fire Prone Areas, UC San Diego News Ctr. (Feb. 28, 2019), https://ucsdnews.ucsd.edu/feature/seventy-high-tech-cameras-installed-in-southern-california-provide-eyes-on-fire-prone-areas.

[72] *Wildfire Technology Innovation Summit*, FIRETECHSUMMIT (March 2019), https://firetechsummit.cpuc.ca.gov/

[73] Julia Cart, *CA Pursues a Holy Grail: High-Tech Data to Predict How Wildfire Will Spread*, CAL MATTERS (Oct 23, 2019), https://calmatters.org/environment/2019/10/california-wildfire-response-plan-new-technology.

[74] See, e.g., Adele Peters, This California Fire Chief is Building a Satellite System to Detect Wildfires as Soon as they Start, Fast Company (Sep 16, 2020), https://www.fastcompany.com/90550691/this-california-fire-chief-is-building-a-satellite-system-to-detect-wildfires-as-soon-as-they-start.

C. Fuel Treatment Strategies and Reforms

Wildfire depends on combustible material, or fuel, to burn.[75] Much of California's landscape is replete with fuels: needles, grasses, small twigs, shrubs, branches, logs, and trees. Reducing and rearranging this fuel can reduce the probability of high-severity wildfire, reduce the intensity and severity of wildfires when they do occur, promote healthy ecosystems, and protect people and property by creating fire-adapted communities.[76] Available fuel treatment measures include thinning, pruning, mowing, chipping and prescribed fires. Each of these treatment methods include costs and benefits, and the proper fuel treatment method or methods for any area will depend on its physical characteristics.[77] Common to all methods is the need for extensive on-the-ground management. To this end, FPPP funding could be used to establish robust community-based fuels treatment groups. These groups would allow the county to scale up fuel treatment methods and increase their safety, reducing the severity of fires throughout the county without compromising the availability of fire suppression personnel.

1. Thinning, Pruning, and Mowing

Effective fuel treatment increases the fire resilience of natural areas by reducing fuels on the land's surface, increasing the height to the base of tree crowns, and increasing the spacing between tree crowns.[78] Several strategies are available to achieve these goals. Pruning is the process of removing lower tree limbs, increasing the height of tree crown bases.[79] Thinning involves removing smaller trees and retaining larger, more vigorous trees with more fire-resistant bark. This raises the base of tree crowns, and, if enough larger trees are removed, increases the spacing between tree crowns.[80] Thinning and pruning produces smaller pieces of fuels that can be managed in several ways: removing for future use, scattering to spread out fuel concentration, or piling and burning.[81] Fuels can also be mowed or chipped.[82]

The appropriate method for a given area will depend on the fuel types present and climatic conditions. For example, mowing is only effective against fine fuels, while chipping machines can handle larger materials. Whereas mowing and scattering mostly redistributes fuels, other methods remove fuels from an area or burn them to exhaust their combustive potential. In areas with wind-driven fires, it may be advantageous to space tree crowns further apart; in other locations, this may

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[75] *See generally* James K. Agee & Carl N. Skinner, *Basic Principles of Forest Fuel Reduction Treatments*, 211 FOREST ECOLOGY AND MANAGEMENT 83 (2005), https://www.fs.fed.us/psw/publications/skinner/psw_2005_skinner(agee)001.pdf.

[76] *See* Elizabeth L. & Larissa L. Yocum, *Tamm Review: Are Fuel Treatments Effective at Achieving Ecological and Social Objectives? A Systematic Review*, 375 FOREST ECOLOGY AND MANAGEMENT 84–95 (2016); USDA FOREST SERVICE, ERIK J. MARTINSON & PHILLIP N. OMI, FUEL TREATMENTS AND FIRE SEVERITY: A META-ANALYSIS (2013), https://www.fs.usda.gov/treesearch/pubs/43632.

[77] *See generally* Oregon State University, Stephen A. Fitzgerald & Max Bennett, A Land Manager's Guide for Creating Fire-Resistant Forests 8 (2013), https://catalog.extension.oregonstate.edu/em9087.

[78] *Id.* at 6.

[79] *Id.* at 10.

[80] *Id.* at 9.

[81] *Id.* at 11−13.

[82] *Id.* at 13.

compromise the ecological health of a forest with little strategic benefit. Fuel treatment efforts should be guided by experts who can facilitate the most efficient and effective treatment.

FPPP funds could enable Ventura County to scale up its already-extensive fuel treatment measures. Because many fuel treatment measures involve little risk and require minimal training, thinning, pruning, and piling biomass is an ideal activity for community groups. The Ventura County Fire Department might host field-based workshops and fuel treatment volunteer days, during which residents come together to treat fuels in public high-fire severity areas. Chipper days, organized by local fire safe councils, are another low-cost means of achieving higher levels of community participation in fuel treatment; residents gather biomass from their property and deposit in a location convenient for pick-up.

2. Prescribed Burns

Prescribed burns—fires set intentionally for public benefit—are a more controversial fuel treatment technique. By burning fuels in a controlled environment, future fires in the area may be avoided or substantially reduced in intensity.[83] Today, prescribed burns are recognized as an effective and efficient means of fire fuel management.[84] Such burns have been used to manage California's wildfire for millennia. Indigenous nations' land management practices included the frequent use of intentional burning to cultivate the landscape. Despite decades of reluctance from California's leadership,[85] the state has now largely embraced prescribed burns, building prescribed burning programs into the state's fire management infrastructure.[86] Approximately 125,000 acres of wildlands are treated each year in California using prescribed burning, and the rate of treatment is expected to rise as this tool is used more frequently to reduce the risk of catastrophic wildfires. Despite this, prescribed burns remain underutilized in California.[87] As much as 20 million acres of federal, state, or private land across California needs fuel reduction treatment to reduce the risk of wildfire, according to earlier assessments by CalFire and other state agencies.[88]

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[83] *Id.* at 6.

[84] *See generally* Paulo M. Fernandes & Herminio S. Botelho, *A Review of Prescribed Burning Effectives in Fire Hazard Reduction*, 12 INT'L J. WILDLAND FIRE 117 (2003), https://www.fs.fed.us/rm/pubs/rmrs_gtr292/2003_fernandes.pdf.

[85] Rebecca Miller, *Prescribed Burns in California: A Historical Case Study of the Integration of Scientific Research and Policy*, MDPI (Aug. 2020), https://www.mdpi.com/2571-6255/3/3/44/pdf.

[86] *See, e.g.*, California Air Resources Board, Prescribed Burning, https://ww2.arb.ca.gov/our-work/programs/prescribed-burning.

[87] *See* Kirsten H. Engel, *Perverse Incentives: The Case of Wildfire Smoke Regulation*, 40 ECOLOGY L. Q. 623 (2013);
The Burning Solution: Prescribed Burns Unevenly Applied Across U.S., CLIMATE CENTRAL (May 29, 2019), https://www.climatecentral.org/news/report-the-burning-solution-prescribed-burns-unevenly-applied-across-us; Lenya Quinn-Davidson & J. Morgan Varner, *Impediments to Prescribed Fire Across Agency, Landscape and Manager: An Example from Northern California*, 21 INT'L J. WILDLAND FIRE 210 (2012) (reporting that at the time of the study, "in northern California...prescribed burning annually covered only 38% of the area needed to fulfil land-management objectives, and 66% of managers indicated dissatisfaction with levels of prescribed fire activity.").

[88] CALFIRE, CAL. EPA, CAL. NATURAL RESOURCES AGENCY, CALIFORNIA FOREST CARBON PLAN: MANAGING OUR FOREST LANDSCAPES IN A CHANGING CLIMATE 32 (May 2018), https://resources.ca.gov/CNRALegacyFiles/wp-content/uploads/2018/05/California-Forest-Carbon-Plan-Final-Draft-for-Public-Release-May-2018.pdf.

Prescribed fire is only one among many fuel reduction methods, and it may not be the right tool in many instances. Some researchers have found that prescribed fire is inappropriate for treating Southern California's chaparral land.[89] In forested areas, however, such as Ventura County's Los Padres National Forest, prescribed burns are more useful. The method is also valuable for small-scale restoration projects.[90] In other words, while it may not be appropriate to utilize prescribed burns in Southern California on the same scale at which they are implemented in Northern California, site-specific prescribed burning efforts can remain an important fuel management tool in this part of the state.

Prescribed burn efforts must navigate narrow windows of time when meteorological conditions allow for a safe and effective burn; environmental variables such as fuel moisture and weather conditions must be balanced so that the fire will accomplish its objectives. Fire managers refer to a balance of dry fuels absent the intense heat that can drive prescribed burns out of control as the burn window of opportunity.[91] The fall season, September through November, is generally considered to be the best time to conduct prescribed burns in California, though this depends in large part on the biome present in the burn area.[92] Already-narrow burn windows are narrowing even further as climate change takes its toll. The ability to undertake prescribed burning during the moments in time when physical conditions align is becoming ever more critical.

However, there has historically been strong public opposition to prescribed burning in areas across the state. While public approval of prescribed burns is on the rise,[93] and one California study suggests that public opinion does not pose a significant barrier to certain prescribed burning activities,[94] the practice is still deeply contentious in Southern California, where public disapproval is responsible for preventing some prescribed burns and other comprehensive fire fuel management efforts. Disapproval is especially common among smoke-sensitive groups, environmental activists, and the risk-averse that reside in the WUI.

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[89] *See* Richard W. Halsey, *Threatened by Too Much Fire: The Science Behind Protecting Southern California Chaparral and Sage Scrub Habitats*, 1 San Diego Audobon (Sept./Oct. 2020); THE CALIFORNIA CHAPARRAL INSTITUTE, RICHARD W. HALSEY, CHAPARRAL AS A NATURAL RESOURCE: CHANGING THE CONVERSATION ABOUT CHAPARRAL AND FIRE (2009); Richard W. Halsey, Jon E. Keeley, and Kit Wilson, Fuel Age and Fire Spread in Southern California Chaparral Ecosystems: Natural Conditions vs. Opportunities for Fire Suppression, 69 FIRE MANAGEMENT TODAY 22 (2009), https://www.californiachaparral.org/__static/237d2ef19fae36795a6a17b8469ee235/halsey_et_al_fuel_age_and_fire_spread_fmt-69-2_2009.pdf?dl=1.

[90] E.g., to help germinate grassland seeds dependent on fire.

[91] *See* Stanford Univ., The Bill Lane Center for the American West, *Gaining in Public Acceptance, Can Prescribed Fires Head Off Devastating Wildfires?* (July 18, 2019), https://west.stanford.edu/news/blogs/and-the-west-blog/2019/can-prescribed-fires-head-off-devastating-wildfires.

[92] A recent study in the Lake Tahoe Basin found that conditions most favorable for prescribed fire are most common in spring and autumn. *See* Randy Striplin, Stephanie A. McAfee, Hugh D. Safford, and Michael J. Papa, *Retrospective Analysis of Burn Windows for Fire and Fuels Management: An Example From the Lake Tahoe Basin, California, USA*, 16 FIRE ECOLOGY (2020).

[93] *See* Stanford Univ., The Bill Lane Center for the American West, *Gaining in Public Acceptance, Can Prescribed Fires Head Off Devastating Wildfires?* (July 18, 2019), https://west.stanford.edu/news/blogs/and-the-west-blog/2019/can-prescribed-fires-head-off-devastating-wildfires.

[94] Lenya Quinn-Davidson & J. Morgan Varner, *Impediments to Prescribed Fire Across Agency, Landscape and Manager: An Example from Northern California*, 21 INT'L J. WILDLAND FIRE 210, 212 (2012).

Additional study of and public education about prescribed burning could reduce public opposition to the targeted deployment of prescribed burns, allowing them to better take advantage of favorable burn windows. Local jurisdictions could play a role in the development of research related to the impact and efficacy of prescribed burns. There is a dearth of scientific literature focusing on prescribed burns, air quality impact, risk, and other key features of the prescribed burning process. Researchers have already begun developing methods to model the impact of prescribed burns, finding that prescribed burns can be managed to substantially reduce smoke impacts relative to wildfires.[95] In a similar vein, SB 1260, passed in 2018, calls on the California Air Resources Board to develop an air quality and smoke monitoring program for prescribed burns.[96] To better understand the efficacy of prescribed burns in Ventura County, some limited amount of FPPP funding could be made available for research to study burn risk and impact across different ecosystems within the County. Results of such a study could inform key changes to the prescribed burning process on the local level to ensure that burns can be executed as needed.[97] A more complete understanding of the role of prescribed burning could also be folded into existing community education and outreach programs.

Beyond public opposition, regulatory and personnel-related hurdles also limit the targeted use of prescribed fire.[98] Authorization to conduct a prescribed burn still hinges on securing a permit from the air pollution control district with jurisdiction over the burn area.[99] This process is sometimes a source of prescribed burn delay in specific locations throughout the state.[100]

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[95] *See* Jonathan W. Long, Leland W. Tarnay, and Malcolm P. North, *Aligning Smoke Management with Ecological and Public Health Goals*, 115 J. FOR. 1 (Jan. 19, 2017).

[96] *See* SB-1260 (2017-2018 session), available at https://leginfo.legislature.ca.gov/faces/billTextClient.xhtml?bill_id=201720180SB1260.

[97] Changes in the scientific understanding of prescribed fire have driven significant policy shifts over time. *See* Rebecca Miller, *Prescribed Burns in California: A Historical Case Study of the Integration of Scientific Research and Policy*, 3 FIRE 44 (Aug. 19, 2020).

[98] *See generally* James Temple, *Suppressing Fires Has Failed. Here's What Calfornia Needs to Do Instead*., MIT TECH. REV. (Sept. 17, 2020), https://www.technologyreview.com/2020/09/17/1008473/wildfires-california-prescribed-burns-climate-change-forests.

[99] While CEQA has long hindered more aggressive fire-treatment efforts, the California Vegetation Treatment Program (CalVTP), authorized in 2019, streamlined the CEQA permitting process for controlled burns. The CalVTP authorizes a statewide programmatic Environmental Impact Review for vegetation treatment projects, from controlled burns to fuel breaks. The CalVTP will allow CalFire, along with other agency partners, to expand their vegetation treatment activities to treat up to approximately 250,000 acres per year, contributing to the target of 500,000 annual acres of treatment on non-federal lands. In short, CEQA no longer poses the same barrier to prescribed burns as it once did. *See, e.g.*, Office of Governor Gavin Newsom, California Certifies Statewide Programmatic Environmental Impact Review to Protect Californians from Catastrophic Wildfires (Dec. 31, 2019), https://www.gov.ca.gov/2019/12/31/california-certifies-statewide-programmatic-environmental-impact-review-to-protect-californians-from-catastrophic-wildfires.

[100] Lenya Quinn-Davidson & J. Morgan Varner, *Impediments to Prescribed Fire Across Agency, Landscape and Manager: An Example from Northern California*, 21 INT'L J. WILDLAND FIRE 210, 212 (2012). *But see* Courtney A. Schultz, Sarah M. McCaffrey, and Heidi R. Huber-Stearns, *Policy Barriers and Opportunities for Prescribed Fire Application in the Western United States*, 28 INT'L J. WILDLAND FIRE 874, 875 (2019) (arguing that survey design has led researchers to overestimate the impact of air quality regulations on prescribed burns); Robert York, Ariel Roughton, Ryan Tompkins, and Susan Kocher, *Burn Permits Need to Facilitate — Not Prevent — "Good Fire" in California*, 74 CAL. AG. 62, 63 (2020), http://calag.ucanr.edu/archive/?type=pdf&article=ca.2020a0014 (doubting that air quality regulations are the barrier that they're perceived to be); Lenya Quinn-Davidson, *The Fire Problem is a Cultural Problem — Where Do We Go From Here?*, William Main Seminar, UC Berkeley (Apr. 23, 2019),

Currently, the air district authorization process requires several major steps. [101] To lawfully undertake a prescribed burn, a burn manager must register their burn with the air district;[102] obtain a burn permit from the local air district and/or fire agency;[103] submit a smoke management plan (SMP) to the air district; obtain the air district's approval of the SMP; contact adjacent air districts that may be affected by the burn; and be given the green light to commence the burn on the day of the burn. Many airsheds receive a large volume of applications for prescribed burns in a single season; Ventura County Air Pollution Control District receives 300-500 burn permit requests per year.[104] Sometimes, not all of these applications can be approved, and air districts are not subject to time limitations to process the initial burn application information.

In Ventura, members of the County Board sit on the Ventura County Air Pollution Control District. This presents the opportunity for Ventura leadership to streamline the authorization process for beneficial prescribed burns (as opposed to agricultural and other burns). FPPP funding could be utilized in the adoption of reforms including: the application of shortened turnaround times to authorize SMPs; the hiring of additional application reviewers to expedite the burn permit application process; the removal or reduction of permitting fees for publicly beneficial burning;[105] and full implementation of the Prescribed Fire Incident Reporting System to facilitate coordination between burn managers and airsheds.[106]

Even if the meteorological conditions are acceptable and the necessary authorizations are obtained, burn managers regularly lack the necessary personnel to manage prescribed burns. [107] Firefighters are spread thin managing wildfire risk during the fire season. Many CalFire crews are seasonal employees hired during the time of greatest wildfire suppression need, rather than full-time employees, and CalFire can divert crews from conducting planned burns to extinguishing wildfires in other regions of the state. Faster authorization for burn permits,

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berkeley.edu/files/LQuinnDavidson_MainSeminar_April%202019_0.pdf (identifying the perception that air quality regulations are a barrier to prescribed burns as a cultural phenomenon not necessarily rooted in empirical data).

[101] California's smoke management program is an integrated state and local effort. The Smoke Management Guidelines, adopted by the California Air Resources Board, establish the fundamental framework for the program. *See* California Code of Regulations, Title 17, https://ww3.arb.ca.gov/smp/regs/revfinregwtoc.pdf. Additionally, individual local air districts implement and enforce local rules and regulations. For Ventura County Air Pollution Control District's rules and regulations, see Ventura County Air Pollution Control District, Rules and Regulations, http://www.vcapcd.org/Rulebook/RuleIndex.htm.

[102] In Ventura, a burn permittee must notify the Ventura County Air Pollution Control District and CAPCD of any planned burn project by prescribed fire at least three months prior to the planned burn. Ventura County Air Pollution Control District, Smoke Management Program 3−4 (Nov. 13, 2001), www.vcapcd.org/pubs/Monitoring/SmokeManagementPlan.pdf.

[103] In Ventura, prescribed burns are allowed by permit from one of the public burn agencies in the County: Ventura County Fire Protection District (VCFPD), California State Parks, National Park Service, and Los Padres National Forest. *Id.* at 3−1.

[104] *Id.* at 4−3.

[105] To view the current fee schedule, see Ventura County Air Pollution Control District, Rulebook, http://www.vcapcd.org/Rulebook/Reg3/RULE%2042.pdf.

[106] Rebecca K. Miller, Christopher B. Field, and Katharine J. Mach, *Barriers and Enablers for Prescribed Burns for Wildfire Management in California*, 3 NATURE SUSTAINABILITY 101, 105 (2020).

[107] *Id.*; *see also* Courtney A. Schultz, Sarah M. McCaffrey, and Heidi R. Huber-Stearns, *Policy Barriers and Opportunities for Prescribed Fire Application in the Western United States*, 28 INT'L J. WILDLAND FIRE 874 (2019).

discussed above, could allow burn managers to move forward with beneficial prescribed burns outside of the fire season, easing these competing demands on firefighting personnel.

Prescribed fire management may also be less attractive to some firefighters, as it provides fewer overtime opportunities and lacks the hazard pay that comes with wildfire fighting. In 2018, CalFire established ten prescribed burning crews, which conduct all manner of fuel treatment work. Experts report that these crews are inadequate in number and, because of the relative attractiveness of wildfire suppression work, suffer a significant amount of attrition to suppression crews. However, there is precedent for non-firefighters to serve as prescribed burn managers in California. To train non-firefighters to safely and appropriately engage in fuel treatment efforts, Ventura County could utilize FPPP funding to establish robust community-based fuels treatment groups. Through such groups, communities would receive expert training and conduct prescribed burns with the guidance of certified burn managers. The Humboldt County Prescribed Burn Association is a strong example of this model. Through the Association, experts have hosted lectures and field-based workshops over the past few years to increase the public's comfort with prescribed fire and led burns on private lands.[108] At the time of its 2018 founding, the Association was the first organization of its kind in the West; it has already inspired the creation of similar groups in Northern California's Plumas, Nevada, Sonoma, and Mendocino counties. These groups bring landowners and neighbors together to provide the manpower that prescribed burns require.

D. Enhanced Community Education and Outreach Programs

Implementation of the strategies discussed above will depend on expanding community education and outreach efforts. Studies show that public perception of wildfire risk and management measures are integral to local prevention and mitigation efforts[109] and statewide wildfire legislation.[110] While the Ventura County Fire Department website provides informational resources related to wildfire prevention and preparedness, the vast majority of these tools are difficult to locate and unidirectional (i.e., non-interactive, such as pamphlets or information guides). To increase community engagement with and knowledge about wildfire prevention and mitigation efforts, Ventura County could utilize FPPP funds to increase the availability of interactive, hands-on educational measures. Such information sources are both generally preferred by the public and more effective than unidirectional sources.[111] Educational

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[108] *See* Delilah Friedler, *California's Wildfire Policy Totally Backfired. Native Communities Know How to Fix It*, MOTHER JONES (Nov. 11, 2019), https://www.motherjones.com/environment/2019/11/californias-wildfire-controlled-prescribed-burns-native-americans.

[109] *See, e.g.*, Sarah M. McGaffrey, Prescribed Fire: What Influences Public Approval? (2006), https://www.nrs.fs.fed.us/pubs/gtr/gtr_nrs-p1/mccaffrey_p1_192.pdf (suggesting that a critical element to boost prescribed burn fuel treatment is by increasing familiarity with the practice); see also Rebecca K. Miller, Christopher B. Field, and Katharine J. Mach, Barriers and enablers for prescribed burns for wildfire management in California, Nature Sustainability, 103 (2020) ("federal and state government employees claimed that negative public opinion [of prescribed burns] remains a challenge, although opposition diminishes with education.").

[110] *See* Rebecca K. Miller, Christopher B. Field, and Katharine J. Mach, *Barriers and Enablers for Prescribed Burns for Wildfire Management in California*, 3 NATURE SUSTAINABILITY 101, 107 (2020) (observing that wildfire legislation patterns appear significantly related to public perceptions of wildfire risk).

[111] U.S. Forest Service, Sarah M. McCaffrey & Christine S. Olsen, Research Perspectives on the Public and Fire Management: A Synthesis of Current Social Science on Eight Essential Questions, 6-7 (2012), https://www.fs.usda.gov/treesearch/pubs/41832

and outreach programs effectively implemented in other states, such as Oregon and Colorado, can provide inspiration as Ventura County expands efforts.

Currently, the Ventura County Fire Department primarily utilizes unidirectional, English-only PDFs,[112] pamphlets, and brochures to disseminate wildfire-related information.[113] The Fire Department's "Robby to the Rescue!" video series, wherein a firefighter answers questions sent in by the community, is a good example of a more interactive, engaging educational tool. However, because the "videos" page is not organized by topic, searching for information can be challenging.[114] The videos are also only accessible via the Internet, which means that County residents lacking Internet accessibility are less likely to have the opportunity to engage with this information.[115]

In addition, the County's resources related to home hardening and defensible space are limited. Home hardening is not discussed at length on the County's website; the only educational resource on the website that describes home hardening, even briefly, is under the "Wildland Safety" link from the "Safety Preparedness Links."[116] And while defensible space is discussed both under the County's "standards and guidelines" page[117] and on the webpage for the FHRP,[118] additional resources, like best practices for clearance and replanting and photo guides of desirable and undesirable/prohibited plants, would help residents better understand how to manage vegetation on their properties. To build upon existing resources, the following tools could be employed:

- ***Interactive videos and phone apps on home hardening and vegetation management.*** Ventura County could build on its "Robby to the Rescue" series, including videos that teach landowners how to build and remodel structures using home hardening measures like roof replacement,[119] instructional videos on firewise landscaping, videos identifying flammable invasive plants and fire-resistant plants, and tutorials for creating defensible

[112] Some of these PDFs and brochures are provided in English and Spanish, most notably the Ventura County Emergency Preparedness Guide, but many are only in English. *Ready, Set Go!*, VENTURA CNTY FIRE DEP'T, https://vcfd.org/public-info/ready-set-go.

[113] *Standards & Guidelines*, VENTURA CNTY FIRE DEP'T, https://vcfd.org/fire-prevention/standards-guidelines.

[114] *Ventura County Fire Department*, VIMEO, https://vimeo.com/venturacountyfire (accessed November 2020).

[115] Some County residents do not have reliable Internet access, a fact that has gained attention during the COVID-19 pandemic as school, work, and social events have shifted online while public libraries and other institutions that provide accessible computers have shut down for safety purposes. In addition, even with Internet access, some community members may not read English well enough to understand the resources provided by the Ventura County Fire Department. Other members of the community, especially senior citizens, may not have the technical knowledge needed to effectively conduct Internet research.

[116] Searching for "home hardening" on the Ventura County website yields no results. *Nothing Found*, VENTURA CNTY FIRE DEP'T, https://vcfd.org/?s=home+hardening (accessed November 2020); *Wildland Safety*, VENTURA CNTY FIRE DEP'T, https://vcfd.org/wildland-safety.

[117] *Standards & Guidelines*, VENTURA CNTY FIRE DEP'T, https://vcfd.org/fire-prevention/standards-guidelines.

[118] *Fire Hazard Reduction Program (FHRP)*, VENTURA CNTY FIRE DEP'T, https://vcfd.org/fire-prevention/fire-hazard-reduction-program-fhrp.

[119] ODF makes this information available in PDF form through its Oregon Explorer website, which, among other things, provides information regarding construction in WUI zones. Ventura County could adapt some of this information to be Southern California-specific and presentable in a video format.

space around a home.[120] The County could also explore the development of phone apps that assist property owners in implementing home hardening and defensible space best practices. The Oregon Department of Forestry (ODF) offers a number of resources, including educational videos and a fire-resistant plant identification app, that could serve as models.[121]

- ***Operation of a publicly accessible model fire-resistant home.*** ODF maintains the Oregon Garden Fire Safety House, a life-sized house that people can visit to see how to implement proper fire safety measures on one's own property.[122] Providing an accurate, ideal model of a fortified house in a realistic way—as opposed to stylized drawings on brochures—can help improve the public's understanding of what home hardening and defensible space actually entails. In order to increase access, Ventura County could also create a virtual tour of the fire-safe home that is accessible online in both English and Spanish.

- ***In-person community outreach sessions.*** Ventura County could increase the audience for these educational tools by teaming up with schools, religious groups, and other community groups. Property owners may not recognize the extent of the role they can play in fortifying their homes and communities against wildfires. In-person outreach can increase awareness, provide a forum for the dissemination of printed resources, and connect County residents with programs that can help them fortify their neighborhoods.[123] Community groups may also, with County assistance as discussed above, organize to train community members how to manage prescribed burns or gather to undertake neighborhood vegetation management efforts.[124] In addition, community groups can provide translation services for non-English speakers.

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[120] ODF makes videos on these topics available through YouTube and its own phone app. https://apps.apple.com/us/app/fire-resistant-landscape-plants/id962487127; https://play.google.com/store/apps/details?id=edu.oregonstate.fireplants

[121] *Id.*

[122] *Oregon Garden Fire Safety House*, FIREWISE COMMUNITIES, https://www.oregon.gov/odf/Documents/Fire/Fire-Safety-House.pdf.

[123] For example, the Colorado Springs Fire Department's "Sharing the Responsibility" wildfire awareness campaign involves active engagement with residents and homeowners' associations, meetings with different communities and neighborhoods, the development of homeowner guides, providing on-site risk assessments and consultations, and disseminating brochures and other educational tools. The effort has evolved into a community lecture series that discusses wildfire risk mitigation, wildfire behavior, and forest health and arbor care. The community also has a Wildfire Mitigation Season kick-off each spring to alert residents of the need for action prior to the official start of wildfire season. *Lessons Learned from Waldo Canyon*, FIRE ADAPTED COMMUNITIES, https://fireadapted.org/wp-content/uploads/2018/06/waldo-canyon-report.pdf.

[124] The Colorado Springs Fire Department Wildfire Mitigation Section accomplishes fuel management through stewardship agreements with private and public property owners. Colorado Springs fuels management projects are estimated to result in significant savings. Relatedly, many Colorado fire departments also undertake community measures such as fire fuel chipping to help manage fire risk in their districts. For example, the Colorado Springs Fire Department works in stewardship with over 100 neighborhoods to assist residents with disposal of tree branches and hazardous vegetation via our neighborhood chipping program. Chipping occurs during a predetermined week for each neighborhood. *Neighborhood Chipping Program*, COLORADO SPRINGS FIRE DEP'T, https://coloradosprings.gov/fire-department/page/neighborhood-chipping-program.

- ***Partnerships with nearby colleges and universities.*** Another way to increase community engagement is to coordinate with state universities and colleges, as OFD does. Oregon State University, a public school that receives state funding, provides unique outreach programs to teach landowners about land management in the WUI. Oregon State's College of Forestry provides the Basic Forestry Shortcourse, which is an introductory program for people who are new to managing a woodland property.[125] The course uses classroom instruction and field days to teach participants about common land management activities such as tree planting, thinning, and harvesting, and about the rules and regulations that apply to forestlands.[126] Educational courses such as this can ensure that landowners properly implement home hardening, defensible space, and fuel management measures. Using FPPP funds, Ventura County could team up with local community colleges or state-funded colleges, like CSU Channel Islands, to offer educational programs for Ventura County residents. Colleges and universities would also be valuable partners to conduct much-needed research regarding the air quality impacts of prescribed burns and their efficacy across different ecosystems in Southern California.

V. Funding Sources for the FPPP

Our research identified multiple potential funding sources for the FPPP, some of which may have continued viability in the long-term if the program is a success. It may be possible for the FPPP to rely on one, or a combination of, these funding streams; some of the discussed funding sources may be more readily available in the short-term, while others may be available on a longer time horizon.

Funding sources potentially available on a shorter time horizon include unallocated Cap-and-Trade revenue, California Energy Commission (CEC) Property Assessed Clean Energy (PACE) Loss Reserve Program funds, and/or Federal Emergency Management Agency (FEMA) matching funds. Potential longer-term funding sources include unallocated wildfire protection funds generated by the recently-passed Proposition 19, an assessed fee for wildfire prevention and mitigation, and/or a County-level development linkage fee imposed on new development in the WUI. Each potential funding source is discussed below.

- ***Cap-and-Trade wildfire prevention funds.*** California's Cap-and-Trade program sets emission limits for carbon dioxide and related pollutants for different industries in California that collectively make up 85% of the state's greenhouse gas emissions.[127] Regulated entities are required to surrender compliance mechanisms to the State equivalent to the amount of their emissions, and may purchase compliance mechanisms at State-run actions to cover their obligations.[128] The revenue generated by these purchases is allocated to programs throughout the state that have an emissions reduction

[125] *Our Programs*, OREGON STATE UNIVERSITY COLLEGE OF FORESTRY (2020), https://www.forestry.oregonstate.edu/forestry-and-natural-resources/fnr-programs.
[126] *Id.*
[127] Nathaniel Keohane & Kelley Kizzier, *How Cap and Trade Works*, ENVTL. DEFENSE FUND, https://www.edf.org/climate/how-cap-and-trade-works (last visited Nov. 23, 2020); *see also Cal. Cap and Trade*, CTR. FOR CLIMATE & ENERGY SOLUTIONS, https://www.c2es.org/content/california-cap-and-trade/ (last visited Nov. 23, 2020) (providing an overview of California's Cap-and-Trade program).
[128] *Id.*

nexus.[129] 60% of Cap-and-Trade funds are continuously allocated (to affordable housing, low carbon transit, intercity rail, and high-speed rail) and 40% are allocated by the Legislature to specific programs depending on need.[130] Some Cap-and-Trade money is already allocated towards urban forestry, forest health restoration, and reforestation,[131] and $170 million of Cap-and-Trade funds were directed towards fire prevention in 2018.[132] Although Cap-and-Trade revenue is variable and the Cap-and-Trade Program will sunset in 2030 without extension legislation, Cap-and-Trade revenue could, at the very least, be a potential short-term source of funding for the FPPP.

- ***PACE Loss Reserve Program funds.*** The PACE Loss Reserve Program is administered by the California Energy Commission (CEC) to improve energy efficiency.[133] "Property owners in a PACE-designated area can use PACE financing to retrofit their homes without putting any money down and repay via property tax bills."[134] The CEC has granted a significant amount of PACE Program funds to Ventura County to utilize for conservation projects that lower energy use. Since many home hardening measures also make homes more energy efficient, PACE Program funding could potentially be accessed to support both home hardening efforts and energy reduction measures simultaneously.

- ***FEMA matching funds.*** FEMA runs Hazard Mitigation Assistance (HMA) grant programs to assist states with disaster mitigation work.[135] Two of these programs are the Hazard Mitigation Grant Program (HMGP) and the Pre-Disaster Mitigation (PDM) program. Both of these programs have specific cost-share contribution requirements; through them, FEMA will match state funds directed towards disaster relief or prevention work. Under the HMGP, FEMA provides funds for mitigation programs in areas experiencing a major disaster.[136] FEMA will pay up to 75% of costs for eligible mitigation activities, and the other 25% of funds must come from non-federal resources, including state or local taxes and donations from businesses, homeowners, or nonprofits. If funds are used to mitigate loss in repetitive or severe repetitive loss properties, then FEMA may provide either 90% or 100% of funds, respectively. The PDM grant program is funded through Congressional appropriation, which also provides matching funds to states and local governments for mitigation programs through a 75/25 cost-share model. Accordingly, any state funding allocated to the FPPP may be put towards the cost-share

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[129] *Id.*; *see also How the Funding Works*, TRANSFORM, https://www.transformca.org/landing-page/how-the-funding-works (last visited Nov. 23, 2020) (explaining how California's Cap-and-Trade funding is distributed).
[130] *How the Funding Works*, TRANSFORM, https://www.transformca.org/landing-page/how-the-funding-works (last visited Nov. 23, 2020).
[131] *Id.*
[132] Kimberly Veklerov, *Cal. Giving Out $170 Million in Cap-and-Trade Revenue to Help Prevent Wildfires*, GOVT. TECH. (Aug. 8, 2018), https://www.govtech.com/em/preparedness/California-Giving-Out-170-Million-in-Cap-and-Trade-Revenue-to-Help-Prevent-Wildfires.html.
[133] *Property Assessed Clean Energy (PACE) Loss Reserve Program*, CAL. TREASURER, https://www.treasurer.ca.gov/caeatfa/pace/index.asp (last visited Nov. 23, 2020).
[134] *Id.*
[135] Hazard Mitigation Assistance Cost Share Guide, Fed. Emergency Mgmt. Agency, Dep't of Homeland Sec. 1-1, (2016), https://www.fema.gov/sites/default/files/2020-08/fema_hma_cost-share-guide.pdf.
[136] Formally, such disasters are "declared" by a Presidential major disaster declaration. *Id.*

requirement of either FEMA programs, allowing the state to access federal dollars for the continued operation of the program.

- ***Wildfire protection funds associated with newly-passed Proposition 19.*** [137] Proposition 19, passed in November 2020, generates revenue from increased taxes on inherited property, as well as a reduction in school-related costs due to these increased property taxes.[138] Part of this revenue is earmarked for fire protection.[139] Per Proposition 19's terms, such funding is generally intended to support fire response efforts, but there may be some flexibility to allocate funds to prevention and mitigation-related efforts.[140] However, allocation of wildfire protection funding is conditional on the State's meeting its constitutional guarantees for education funding; given budgeting uncertainty due to COVID-19, Proposition 19-generated wildfire protection funding may not be immediately available.[141] Some estimate that it is likely wildfire funding will not be available until at least 2025.[142]

- ***An assessed wildfire prevention fee.*** Since the expansion of homes in the WUI increases the risk of wildfires and makes it more likely fires will be destructive,[143] a fee could be assessed on all habitable structures in the WUI. This fee structure would mimic the State Responsibility Area (SRA) Fire Prevention Fee (SRAFPF), which was imposed by enactment starting in 2011 to fund fire prevention services.[144] The SRAFPF levied a $152.33 tax on all habitable structures in SRAs throughout the state.[145] Revenue was

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[137] *Proposition 19*, CAL. GENERAL ELECTION NOV. 2, 2020 OFFICIAL VOTER INFORMATION GUIDE, https://voterguide.sos.ca.gov/propositions/19/ (last visited Nov. 23, 2020); *see also* Kathleen Pender, *Proposition 19 passes, but Questions About California Property Taxes Remain*, S.F. CHRON. (Nov. 12, 2020, 8:19 PM), https://www.sfchronicle.com/business/networth/article/Prop-19-passes-but-questions-about-California-15722774.php (noting potential issues with Prop. 19 implementation).

[138] *Cal. Proposition 19*, BALLOTPEDIA, https://ballotpedia.org/California_Proposition_19,_Property_Tax_Transfers,_Exemptions,_and_Revenue_for_Wildfire_Agencies_and_Counties_Amendment_(2020) (last visited Nov. 23, 2020); *see also Changes Certain Property Tax Rules. Legislative Constitutional Amendment. California Proposition 19 (2020)*, UC Hastings Scholarship Repository (2020), https://repository.uchastings.edu/cgi/viewcontent.cgi?article=2385&context=ca_ballot_props (explaining how Prop. 19 will change the way property taxes are levied and utilized).

[139] *Proposition 19*, LEG. ANALYST'S OFFICE (Nov. 3, 2020), https://lao.ca.gov/BallotAnalysis/Proposition?number=19&year=2020.

[140] *Id.*

[141] Liam Dillon, *Who Wins and Who Loses With Cal. Property Tax Measure Proposition 19*, L.A. TIMES (Oct. 19, 2020, 5:00 AM) https://www.latimes.com/homeless-housing/story/2020-10-19/proposition-19-property-tax-ballot-measure-explained-california; *see also* GABRIEL PETEK, LEG. ANALYST'S OFFICE, THE FISCAL OUTLOOK FOR SCHOOLS AND COMMUNITY COLLEGES 9-11 (2019), https://lao.ca.gov/Publications/Report/4113 (last visited Nov. 23, 2020) (summarizing the fiscal outlook for California schools and community colleges in the coming years).

[142] Liam Dillon, *Who Wins and Who Loses With Cal. Property Tax Measure Proposition 19*, L.A. TIMES (Oct. 19, 2020, 5:00 AM) https://www.latimes.com/homeless-housing/story/2020-10-19/proposition-19-property-tax-ballot-measure-explained-california.

[143] Volker C. Radeloff et al., *Rapid Growth of the U.S. Wildland-Urban Interface Raises Wildfire Risk*, 115 PNAS 3314, 3317 (2018), https://www.pnas.org/content/pnas/115/13/3314.full.pdf.

[144] *About the Fire Prevention Fee*, FIRE PREVENTION FEE, https://www.firepreventionfee.org/#:~:text=About%20the%20Fire%20Prevention%20Fee&text=The%20fee%20is%20applied%20to,be%20occupied%20for%20residential%20use (last accessed Nov. 23, 2020).

[145] *Id.*

directed to CalFire, which was charged with using it to implement general fire prevention and mitigation measures statewide.[146] Many fire experts were proponents of the SRAFPF because it was the first dedicated funding stream for. However, the program ultimately proved unpopular because it attached additional fees to property at the height of the Great Recession and lacked strong reporting requirements to track the use of funds. AB 398 (2017) suspended it until June 30, 2031, as part of the deal to extend the Cap-and-Trade Program past its original sunset date of 2020.[147] If a similar fee were to be assessed in the future, we would recommend attaching strict prevention and mitigation-oriented requirements to the use of funds[148] and including a strong reporting mechanism to demonstrate benefits to the public. However, imposing such a fee is likely to be politically challenging because of the significant expense already associated with living in fire-prone areas and the high cost of living in California generally.

- ***A County-level development linkage fee.*** Specific County-level fees could be imposed to generate a permanent local funding stream for essential features of the FPPP. Of particular concern is the ability of indigent property owners to comply with fire resistance standards. Punitive models of encouraging compliance with these standards are necessarily regressive. Given the importance of widespread compliance with vegetation management/defensible space and home hardening standards, it is critical to develop alternative means of boosting compliance in disadvantaged areas. Ventura County could adopt a zoning ordinance requiring building permits for projects in the WUI to be conditioned on payment of a fee into a public fund, the revenue from which could be made available through a grant program for those unable to comply with fire resistance standards. While fire-related fees are often a feature of development agreements, these are generally applied on an ad hoc basis, and the resulting revenue is not earmarked for use by indigent residents for fire resistance standard compliance. Such a linkage fee would have the additional benefit of discouraging development in the WUI.[149]

VI. Conclusion

As experts continue to sound the alarm on the need to change California's wildfire policies, members of the Legislature, local officials, and residents must listen and take action. Increasing the State's emphasis on prevention and mitigation is critical for protecting people, property, and the environment and ensuring that wildfires do not continue to be as destructive as they have been in recent years.

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[146] *SRA Fire Prevention Fee Frequently Asked Questions*, BATTLE CREEK WATERSHED CONSERVANCY, http://www.battle-creek.net/docs/fire/FireFeeFAQs.pdf (last accessed Nov. 23, 2020).

[147] *State Responsibility Area Fire Prevention Fee*, CAL FIRE, https://www.fire.ca.gov/grants/fire-prevention-grants/state-responsibility-area-fire-prevention-fee/ (last visited Nov. 23, 2020).

[148] A pitfall of the original SRAFPF was that CalFire had limited restrictions on its use of generated revenue, meaning that funds were often utilized for purposes loosely related to prevention, like buying engines or hiring more employees. As a result, communities often failed to see visible prevention-related returns on their payment of the fee.

[149] This is a longstanding goal of fire management advocates and the Legislature. A clear example of the effort to discourage development in the WUI can be found in the 2019 Housing Crisis Act's exemptions for development in high fire hazard severity zones. See Cal. Gov. Code section 65941.1. For such projects, local governments enjoy much broader discretion to limit development.

While experts may disagree about the ideal long-term agency that should be tasked with spearheading this prevention work, they do agree on specific measures that should be taken immediately: augmenting community-oriented home hardening, defensible space, and vegetation management efforts; enhancing risk mapping techniques; appropriately deploying fuel treatment measures; and expanding community outreach and educational programming. The FPPP can serve as a proof-of-concept for how these measures can work in Southern California with adequate financial support. The best practices identified upon the pilot program's completion can then be brought to scale across the region and serve as an example for future prevention and mitigation initiatives.