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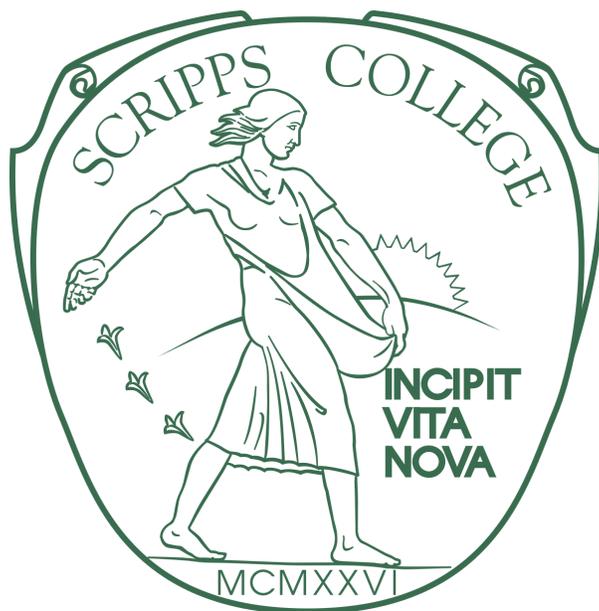
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**THE IMPACT OF PRESCRIBED BURNS AND SMOKE EXPOSURE ON  
MARGINALIZED COMMUNITIES IN CALIFORNIA**

by

**ANNIKA RAGNARTZ**



**SUBMITTED TO SCRIPPS COLLEGE IN PARTIAL FULFILLMENT OF THE  
DEGREE OF BACHELOR OF ARTS**

**PROFESSOR THOMAS KIM  
PROFESSOR KEN MILLER**

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## **Abstract**

In response to the increase in wildfires seen over the past decade, federal, state, and private landowners in California are taking steps to mitigate the effects of future wildfires. A key part of the mitigation plan is to increase the number of prescribed burns being done across the state. This planned substantial increase in prescribed burns aims to protect communities from wildfires but a key concern this paper will address is the impact that this increase is having on marginalized communities in the state. This paper will aim to provide some context for the current situation in California and examine how prescribed burn policies are affecting marginalized communities as well as propose solutions for how to protect specific marginalized communities from the effects of smoke and particulate matter exposure.

## The History of Prescribed Burns in the United States

Prescribed burns are controlled fires set to burn away the dead and overgrown underbrush that would otherwise be fuel for future wildfires. They can be done on a scale from the backyard of a private property up to thousands of acres covering huge swaths of land. Burns have been used in the Americas for thousands of years, starting with Native American tribes across the continent who used them to help with hunting and farming.<sup>1</sup> Burns decrease the forest undergrowth, which allows for more visibility for hunters and returns important nutrients back to the soil that are taken out by plant growth. As European colonizers arrived in North America and settled across the country, they adopted similar prescribed burn practices, allowing fires to burn in remote areas and only suppressing those that threatened human settlements.<sup>2</sup>

This informal practice continued until the US Forest Service was created in 1905 and was placed in charge of “providing quality water and timber for the Nation’s benefit”.<sup>3</sup> Prescribed burns were criticized by the USFS as being damaging to trees and harming timber production.<sup>4</sup> In 1935, the USFS took this attitude and made it a country-wide policy by instating the “10 am rule”.<sup>5</sup> This dictated that all fires, regardless of whether they threatened human settlement or were burning in remote areas, needed to be put out by 10am the day after they started. This

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<sup>1</sup> Sharon Levy, “Rekindling Native Fires,” Oxford University Press (BioScience, April 1, 2005), <https://academic.oup.com/bioscience/article/55/4/303/270417>.

<sup>2</sup> Jan W. van Wagtenonk, “The History and Evolution of Wildland Fire Use,” Fire Ecology (Springer International Publishing, December 1, 2007), <https://fireecology.springeropen.com/articles/10.4996/fireecology.0302003>.

<sup>3</sup> “History & Culture,” Forest Service - History (US Department of Agriculture Forest Service, n.d.), [https://www.fs.usda.gov/wps/portal/fsinternet/cs/main!/ut/p/z0/04\\_Sj9CPykssy0xPLMnMz0vMAflJo8zjQwgnNH CwN\\_DI8zPwBcqYKBfkO2oCADIwpjl/?pname=Forest%20Service%20-%20History%20&navtype=BROWSEBY SUBJECT&ss=110507&pnavid=15000000000000&navid=1501400000000000&ttype=main&cid=null](https://www.fs.usda.gov/wps/portal/fsinternet/cs/main!/ut/p/z0/04_Sj9CPykssy0xPLMnMz0vMAflJo8zjQwgnNH CwN_DI8zPwBcqYKBfkO2oCADIwpjl/?pname=Forest%20Service%20-%20History%20&navtype=BROWSEBY SUBJECT&ss=110507&pnavid=15000000000000&navid=1501400000000000&ttype=main&cid=null).

<sup>4</sup> Rebecca Miller, “Prescribed Burns in California: A Historical Case Study of the Integration of Scientific Research and Policy,” SafetyLit (MDPI: Multidisciplinary Digital Publications Institute, 2020), [https://www.safetylit.org/citations/index.php?fuseaction=citations.viewdetails&citationIds%5B%5D=citjournalarticle\\_663310\\_27](https://www.safetylit.org/citations/index.php?fuseaction=citations.viewdetails&citationIds%5B%5D=citjournalarticle_663310_27).

<sup>5</sup> “U.S. Forest Service Fire Suppression,” Forest History Society, April 9, 2020, <https://foresthistor.org/research-explore/us-forest-service-history/policy-and-law/fire-u-s-forest-service/u-s-forest-service-fire-suppression/>.

practice of intense fire suppression became the norm across the United States for decades and has led to current dangerous levels of undergrowth buildup in many parts of the country.

In recent decades this has coincided with climate change causing a significant decrease in precipitation and rising global temperatures. These factors, in combination with the decades of fire suppression done in the US, are creating the perfect set of conditions for extremely large and destructive wildfires.<sup>6</sup> It is this perfect storm that California is now being forced to address.

### **The Current Status of Prescribed Burn Legislation in California**

Over the past decade, wildfires in California have grown exponentially larger and more dangerous due to climate change and the extreme buildup of vegetation from decades of fire suppression. In response to the devastating California wildfires in 2020, which burned 4.2 million acres, Governor Gavin Newsom passed a \$1.5 billion package aimed at preventing and stopping the spread of wildfires as part of the 2021-2022 California state budget.<sup>78</sup> In March 2022, that spending bill's goals were clarified by an announcement of a *Strategic Plan for Expanding the Use of Beneficial Fire* by the Governor's office.<sup>9</sup> This plan aims to expand the number of acres that are burned annually to 400,000 acres a year by 2025.<sup>10</sup>

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<sup>6</sup> "Wildfires and Climate Change," Center for Climate and Energy Solutions, February 22, 2022, <https://www.c2es.org/content/wildfires-and-climate-change/>.

<sup>7</sup> "SB-129 Budget Act of 2021," SB-129 Budget Act of 2021. (California Legislative Information, July 13, 2021), [https://leginfo.ca.gov/faces/billTextClient.xhtml?bill\\_id=202120220SB129](https://leginfo.ca.gov/faces/billTextClient.xhtml?bill_id=202120220SB129).

<sup>8</sup> Julie Cart, "California's 2020 Fire Siege: Wildfires by the Numbers," CalMatters, July 29, 2021, <https://calmatters.org/environment/2021/07/california-fires-2020/>.

<sup>9</sup> Wade Crowfoot et al., "California's Strategic Plan for Expanding the Use of Beneficial Fire," CALFIRE (Wildfire and Forest Resilience Task Force, March 30, 2022), [https://www.fmtf.fire.ca.gov/media/vuahweso/ca-rx-fire-strategic-plan-2021\\_10-17-21draft.pdf](https://www.fmtf.fire.ca.gov/media/vuahweso/ca-rx-fire-strategic-plan-2021_10-17-21draft.pdf).

<sup>10</sup> "Governor's Task Force Launches Strategic Plan to Ramp Up Wildfire Mitigation with Prescribed Fire Efforts," State of California (Office of Governor Gavin Newsom, March 30, 2022), <https://www.gov.ca.gov/2022/03/30/governors-task-force-launches-strategic-plan-to-ramp-up-wildfire-mitigation-with-prescribed-fire-efforts/>.

These 400,000 acres of prescribed burns are a large part of the overall plan for the federal and state governments to together treat 1 million acres a year in California by 2025.<sup>11</sup> Treatment encompasses mechanically thinning, creating fuel breaks, and prescribed burns all of which make a landscape less susceptible to being burned by wildfires.<sup>12</sup> Prescribed burns are such a significant part of this treatment plan because they offer the state a more cost-effective and far less labor-intensive way to treat large numbers of acres, especially when compared to other treatment practices like mechanical thinning or pile burns which require more labor to treat the same number of acres.

### **Issues with Increase in Prescribed Burns**

Private owners, the state, and federal agencies are all trying to increase the number of acres that they burn over the next few years. Currently, across state, federal, and private lands, around 125,000 acres are burned annually in California.<sup>13</sup> This is significantly below the 400,000 acre goal these agencies are aiming to meet.

The state is struggling to reach its goals for treatment in part because the number of prescribed burns being done by private landowners is much lower than the state's goals. CAL Fire has had a program for decades called the Vegetation Management Program (VMP) which works with private landowners to do burns on their property. Currently, fewer than 10,000 acres a year are burned under this program.<sup>14</sup> This very low number of acres burned is a major factor in

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<sup>11</sup> Wade Crowfoot et al., "California's Strategic Plan for Expanding the Use of Beneficial Fire".

<sup>12</sup> "Mechanical Treatment," US Forest Service, n.d., <https://www.fs.usda.gov/managing-land/fire/mechanical-treatment>.

<sup>13</sup> Sophie Quinton and Alex Brown, "California May Need More Fire to Fix Its Wildfire Problem," The Pew Charitable Trusts (Stateline, September 18, 2020), <https://www.pewtrusts.org/en/research-and-analysis/blogs/stateline/2020/09/18/california-may-need-more-fire-to-fix-its-wildfire-problem>.

<sup>14</sup> Jeffery Stackhouse and Lenya Quinn-Davidson, "Options for Prescribed Fire on Private Lands in California" (University of California Agriculture and Natural Resources, 2019), <https://ucanr.edu/sites/forestry/files/312926.pdf>.

why there has been a push for less regulation of private landowners from the state government and arguments for a more streamlined process for private landowners to conduct their own burns without partnering with CAL Fire. Senate Bill 332, which was passed and signed into law on October 6, 2021, removes liability from private landowners if a prescribed burn escapes their property.<sup>15</sup> This supports the state’s goal of increasing the number of acres burned since landowners no longer need to fear being forced to pay the costs of their burns escaping. However, this also means that landowners now have less incentive to ensure their prescribed burns are safe for the communities around them.

To illustrate the dangers of private prescribed burns, one can turn to an example that occurred in Northern California barely a week after the Senate Bill 332 legislation was passed. On October 15, 2021, a prescribed burn was being carried out on the Estrada Ranch in Santa Cruz County. The burn soon escaped, starting the Estrada Fire. The fire grew from its proposed 10 acres up to 148 acres, required 270 CAL Fire personnel to fight it, and forced 174 people to evacuate their homes.<sup>1617</sup> Currently, the landowner has yet to face any consequences for the damage done and the CAL Fire resources that were deployed to contain the fire.

This burn was initiated by a private landowner who was also a retired CAL Fire Battalion Chief and was done in conjunction with CAL Fire as part of the Vegetation Management Program.<sup>18</sup> Arguably, this situation represents an ideal set of circumstances for a private

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<sup>15</sup> Bill Dodd, “SB-332 Civil Liability: Prescribed Burning Operations: Gross Negligence.,” California Legislative Information, October 7, 2021, [https://leginfo.ca.gov/faces/billTextClient.xhtml?bill\\_id=20210220SB332](https://leginfo.ca.gov/faces/billTextClient.xhtml?bill_id=20210220SB332).

<sup>16</sup> Tony Nuñez, “As Cal Fire Makes Progress on Estrada Fire, Questions Linger about Burn,” The Pajaronian | Watsonville, CA, October 22, 2021, <https://pajaronian.com/as-cal-fire-makes-progress-on-estrada-fire-questions-linger-about-burn/>.

<sup>17</sup> “Estrada Fire Incident Report,” Cal Fire Department of Forestry and Fire Protection, October 20, 2021, <https://www.fire.ca.gov/incidents/2021/10/15/estrada-fire/>.

<sup>18</sup> Matthias Gafni, “‘We Have No Room for Error’: How a Prescribed Burn in Santa Cruz County Got out of Control,” San Francisco Chronicle (San Francisco Chronicle, October 18, 2021), <https://www.sfchronicle.com/bayarea/article/We-have-no-room-for-error-How-a-prescribed-16541165.php>.

landowner's prescribed burn and yet, even under these conditions, the prescribed burn got out of control. This case makes it clear that even under ideal circumstances, prescribed burns are still capable of escaping containment lines and spreading beyond the initial intention of the burn. While the blame for this particular burn jumping its containment lines fell on a misassessment of the volatility of the site's dried vegetation, the conditions at the Estrada Ranch are becoming the norm across California.<sup>19</sup> Climate change and two decades of statewide drought mean that vegetation everywhere has dried out and died, leaving behind volatile fuels. This means that the same conditions leading to wildfires getting larger and more dangerous are also present with prescribed burns and increases the danger of those burns even when done in controlled environments.

### **Logistical Challenges With Climate Change and Prescribed Burns**

The push for deregulation of private landowner burns is coming at a time when prescribed burns are becoming increasingly challenging. In order to meet the state's goals, the number of burns done in a given year must increase dramatically. Unfortunately, decades of fuel build-up combined with a progressively drying climate means that the window of time when it is actually safe to conduct prescribed burns is getting smaller.<sup>20</sup> The dwindling number of days in which prescribed burns can be very safely conducted represents a problem not only for the state but also for community members. Having more burns happen over fewer days means that the main smoke management techniques of reducing or redistributing smoke are increasingly harder to accomplish.

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<sup>19</sup> Gafni, "We Have No Room for Error"

<sup>20</sup> Alex Wigglesworth, "Prescribed Burns Are Key to Reducing Wildfire Risk, but Federal Agencies Are Lagging," Los Angeles Times (Los Angeles Times, November 8, 2021), <https://www.latimes.com/california/story/2021-11-08/us-forest-service-struggles-to-complete-prescribed-burns>.

Reducing smoke can be accomplished by burning smaller areas, reducing the fuel load at a site, or reducing the fuel consumed by the burn.<sup>21</sup> Burning smaller areas represents a problem for the state since their new plan requires a large increase in acres burned. Reducing the fuel load requires thinning out the burn area and removing vegetation that would have burned if left in the area. This strategy is sometimes required for certain burn areas in order to make them safe for prescribed burns to be conducted but it is more labor intensive and thus more expensive than a prescribed burn. Reducing the fuel consumed by the burn requires burning when there is more moisture present so that only small vegetation like twigs and leaves will burn while logs and larger vegetation still have too much moisture to burn. This is an option but will only delay emissions since the fuel that is left will still need to be burned in the future.<sup>22</sup>

Smoke that is created by burns can then also be redistributed by spreading it over a larger space or across a longer time period. To decrease smoke density, burn managers use meteorological conditions like wind and atmospheric lift to quickly spread the smoke out across a larger space, though the success of this strategy is dependent on the conditions of a given day and whether the conditions remain stable throughout the burn.<sup>23</sup> Another option to redistribute the smoke is to burn over multiple days in order to give the smoke time to disperse before burning resumes the following day. However, most of these techniques get harder under the conditions the state currently faces from climate change, vegetation build-up, and a smaller burn season. To meet the state's goals for treatment, either the size of the burns that do occur needs to increase or more burns will need to happen on every available burn day. Either of these options will make it harder to manage smoke using the traditional techniques.

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<sup>21</sup> "Smoke Management Guide for Prescribed Fire and Wildland Fire 2001 Edition" (National Wildfire Coordination Group, December 2001), <https://www.fs.fed.us/pnw/pubs/ottmar-smoke-management-guide.pdf>.

<sup>22</sup> "Smoke Management Guide for Prescribed Fire and Wildland Fire", 141-147

<sup>23</sup> "Smoke Management Guide for Prescribed Fire and Wildland Fire", 151-152

Both of these possibilities of either having larger fires or multi-day burns also represent potential problems for the communities that live near the burn sites. Having larger fires means a higher chance of the burns escaping, and when they do escape they could be much more destructive. The Estrada burn was only supposed to be 20 acres and ended up burning almost 8 times that amount by the time it was contained. A larger burn jumping containment lines poses a significantly larger threat to the neighboring communities. Larger burns also release more emissions at a time, since fuel is being burned in much quicker succession than if the burn was done in smaller pieces over a longer time period. Burning 100 acres on a single day will release 100 acres worth of emissions into the surrounding communities while burning 20 acres a day for 5 days allows the smoke to dissipate and more likely stay below unhealthy levels while still achieving the same number of treated acres.

Of course, in order to do burns over multiple days, conditions need to remain safe for that entire period of time. Burns are subject to regulation about whether or not they can occur based on wind conditions, moisture levels, and other meteorological conditions. However, as evidenced by the Estrada fire, burns can still escape even under “acceptable” conditions. Regulations create a window of time for prescribed burns based on the rain patterns in California. Decades ago, before climate change had as drastically impacted rain patterns, there would typically be a large rainstorm in late September or early October. A few weeks later, once the vegetation had a chance to dry out, then prescribed burns could begin. Now, the first rainstorm may not arrive until late October or even early November, meaning that the burning window is getting smaller and there is less rain overall, making vegetation drier as well. Additionally, by the end of October or November, the sun is so low on the horizon and the weather is cool enough that the vegetation may never dry out enough to conduct prescribed burns very successfully before

winter begins, and prescribed burns become much less effective.<sup>24</sup> All of these conditions taken together mean that being able to burn smaller amounts over multiple days is unlikely to be feasible for most burns.

Wildfire season in California also needs to be taken into consideration, since the resources that are available for wildfire fighting and those available to conduct burns or be on hand to control escaped burns are essentially the same. Fire season begins around May 1st and lasts until roughly the first rainstorm of the season, when all of the large wildfires are able to be contained. That start date, however, is variable across the state and in some locations fire season can be essentially year-round because of drought conditions making it unsafe to conduct burns.<sup>25</sup> As an example, the 2021 wildfire season started unusually early; January 2021 had more than twenty times the acres burned compared to the five-year January average. This pattern of high fire activity continued until October, when the state received its first rain in over 200 days.<sup>26</sup>

Because of these conditions and the larger number of fires that occur during fire season, all prescribed burns that occur in a State Responsibility Area (SRA) during the fire season for that region require a CAL Fire permit. CAL Fire holds responsibility in SRAs and has chosen to require permits for burns, since the risk of prescribed burns getting out of control is much higher and they do not always have the capacity to respond to them. The same firefighters that were called in to deal with the Estrada fire breaking out are also in charge of fighting wildfires both within their local region and across the state if the need arises.

In the past, California did not have a “fire season” in the way that it is referred to now. While fire risks were always higher between late summer and early fall, the massive wildfires we

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<sup>24</sup> Wigglesworth, “Prescribed Burns Are Key to Reducing Wildfire Risk”

<sup>25</sup> “Current Burn Status,” Cal Fire Department of Forestry and Fire Protection, n.d., <https://burnpermit.fire.ca.gov/current-burn-status/>.

<sup>26</sup> “2021 Fire Season,” Cal Fire Department of Forestry and Fire Protection, n.d., <https://www.fire.ca.gov/incidents/2021/>.

are seeing now, while perhaps the new reality, are historically an anomaly. Consequently, the state is still adjusting to a situation where, of the 10 largest wildfires in recorded California history, eight of them occurred between 2017 and 2021.<sup>27</sup> Before these wildfires started growing to the size they regularly achieve now, the state was able to allocate some of the firefighting resources during fire season to carry out prescribed burns with the appropriate amount of back-up in case of an emergency. Now that we have a “fire season” that begins earlier, lasts longer, and creates larger and more dangerous wildfires, the resources to fight them are being stretched too thin to be able to do both.

Prescribed burns have still been allowed to occur during fire season, but only if they meet the conditions that regulations require and if the local firefighting crew, whether it is CAL Fire or a county/city firefighting crew, are available in case it breaches its containment lines. Here again the number of days in which prescribed burns can happen is dwindling. The firefighting resources are now occupied with fighting wildfires for a much larger portion of the time between the 1st of May and the first rainstorm in the fall, making them unable to assist with prescribed burns. CAL Fire reported in 2021 that the “the length of the fire season is estimated to have increased by 75 days across the Sierras and seems to correspond with an increase in the extent of forest fires across the state”.<sup>28</sup> This increase in the fire season and corresponding decrease in available prescribed burn days leaves the state with another set of bad options for how to increase the number of treated acres.

The first option is to allow private landowners to do burns during fire season without adequate support from firefighting units. This could be very dangerous if the burns get out of

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<sup>27</sup> “Top 20 Largest California Wildfires” (Cal Fire Department of Forestry and Fire Protection, January 13, 2022), [https://www.fire.ca.gov/media/4jandlh/top20\\_acres.pdf](https://www.fire.ca.gov/media/4jandlh/top20_acres.pdf).

<sup>28</sup> Rob Mayeda, “Climate in Crisis: Fire Season Changing,” NBC Bay Area (NBC Bay Area, April 6, 2021), <https://www.nbcbayarea.com/news/local/climate-in-crisis/climate-in-crisis-fire-season-changing/2511712/>.

control and create additional wildfires when firefighting resources are already overextended. The other option is to allow the decrease in the amount of time in the year that private burns can occur, which amplifies the problems discussed above. Either each burn will have to be much larger to treat the areas that need to be treated or more burns across the state will have to happen on every available burn day outside of the expanding fire season. Both of these outcomes are likely to lead to increased emissions and thus increased health problems for communities across California who are near the burn sites.

In short, the narrowing of the prescribed burn season coinciding with the state seeking to dramatically increase the number of burns is a recipe for fire danger, and along with it, disproportionately bad health impacts for surrounding communities that are not in a position to protect themselves and are not being adequately supported by the state.

### **Health Impacts of PM 2.5 Exposure from Wildfires and Prescribed Burns**

Taken together, the proposed expansion of prescribed burns and the increase in wildfires raises the risk of negative health impacts on community members in the areas where prescribed burns are occurring. These impacts are not being adequately addressed. Wildfires of any kind, including prescribed burns, release smoke and particulate matter (PM) which can spread over a large geographic area at different densities based on the fire's size, the type of fuel being burned, and the type of fire.

The major health concern with fires is the amount of PM 2.5 that gets released.<sup>29</sup> PM 2.5 is particulate matter that gets released from burning biofuel like trees, grasslands, and other types

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<sup>29</sup> Wayne E. Cascio, "Wildland Fire Smoke and Human Health," *Science of The Total Environment* (Elsevier, December 27, 2017), <https://www.sciencedirect.com/science/article/pii/S004896971733512X>.

of vegetation, leading to the decrease in air quality that is often seen when fires occur.<sup>30</sup> There are different types and sizes of particulate matter, but PM 2.5 in particular is of major concern because the very small size of the particles (<2.5 microns) means that they can more easily get into and stay in people's lungs, causing negative health impacts over both the short and long-term.

The hazards of PM 2.5 exposure are particularly concerning with regard to marginalized communities. In a long-term study of 4.5 million people living in the US completed in 2019, researchers found that African Americans and other people living in economically disadvantaged communities were more vulnerable to adverse health outcomes from PM 2.5 exposure. There is a clear correlation between PM 2.5 exposure and disadvantaged communities in the US, with PM 2.5 levels being much higher in disadvantaged communities.<sup>31</sup> This is especially concerning because even when looking at a range of communities with the same level of PM 2.5 exposure, the health outcomes were worse in marginalized communities. That same study found that 99% of deaths due to PM 2.5 exposure were associated with concentrations below the EPA's current recommended annual average. This is a huge cause for concern because that means that even if regulations for prescribed burns succeed in keeping PM 2.5 levels to EPA recommendations, that still might not be sufficient to protect marginalized communities.

## **Proposed Solutions**

While I will not attempt to solve all of the above problems within the scope of this paper, I will give some suggestions for how the state of California could begin to address these issues. It

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<sup>30</sup> "Air Quality, Wildland Fire, and Smoke Management in the US," The Nature Conservancy (Global Fire Initiative, n.d.), [https://www.conservationgateway.org/Documents/air\\_and\\_fire\\_final.pdf](https://www.conservationgateway.org/Documents/air_and_fire_final.pdf).

<sup>31</sup> Benjamin Bowe, "Burden of Cause-Specific Mortality Associated With PM<sub>2.5</sub> Air Pollution in the United States," JAMA Network Open, September 16, 2019, <https://jamanetwork.com/journals/jamanetworkopen/fullarticle/2755672>.

is crucial that these issues be addressed sooner rather than later because the push for an increased number of prescribed burns are already occurring, and the state must protect marginalized communities now.

As part of the Smoke Management Plan that both the state and private landowners must submit to the local air district for every prescribed burn they carry out, regardless of the time of year, burners are required to indicate if there are any Smoke Sensitive Areas (SSAs) that could be impacted by the burn.<sup>32</sup> The definition of impact is not clarified, but supposedly the entity enacting the burn should check for SSA's in the area around the burn. These SSA's include "populated areas and other areas where an air district determines that smoke and air pollutants can adversely affect public health or welfare." This typically includes "towns and villages, campgrounds, trails, populated recreational areas, hospitals, nursing homes, schools, roads, airports, public events, [and] shopping centers".<sup>33</sup> The two main issues with the current SSA's is the scope of how close an SSA must be to be included in the calculus for a prescribed burn as well as which places are defined as SSA's.

Smoke can travel for a much larger distance than the areas immediately adjacent to where a burn is being conducted. As evidenced by the smoke pattern that the US experienced during the 2020 fire season, smoke from fires on the West Coast traveled across the entire US and raised the Air Quality Index (AQI) numbers well above a healthy level from thousands of miles away.<sup>34</sup> While most of these wildfires were much larger than a prescribed burn is ever supposed to be, the same idea can be applied on a smaller scale to the smoke from prescribed burns. How far

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<sup>32</sup> "Smoke Management Guidelines for Agricultural and Prescribed Burning" (Air Review Board, June 2021), <https://ww2.arb.ca.gov/sites/default/files/2021-06/Title17.pdf>.

<sup>33</sup> "Smoke Management Plan - Application for Burn Permit" (Sacramento Metropolitan Air Quality Management District, n.d.), [https://www.airquality.org/SVBAPCC/Documents/SMPAppendix1\\_2010.pdf](https://www.airquality.org/SVBAPCC/Documents/SMPAppendix1_2010.pdf).

<sup>34</sup> Sarah Gibbens, "Wildfire Smoke Blowing across the U.S. Is More Toxic than We Thought," Environment (National Geographic, July 23, 2021), <https://www.nationalgeographic.com/environment/article/wildfire-smoke-blowing-across-country-more-toxic-than-we-thought>.

smoke travels is highly dependent on the weather conditions, since smoke travels the furthest when it rises above the atmospheric boundary layer, which can be anywhere from 1,000 feet to a mile above the ground.<sup>35</sup> Wind is an important factor that can both hurt and help smoke dispersal. Higher winds will disperse the smoke but higher winds also make it less safe to conduct burns since they can cause the fire to move too fast and break containment lines so burns are generally done when there is very little wind. Wind conditions also change throughout the day and can change quite rapidly so smoke could be dispersed in a safe direction for part of the burn and then just as quickly be heading in the direction of a densely populated area or another smoke sensitive area.<sup>36</sup>

For these reasons, the parameters for which smoke sensitive areas should be included when looking at the impacts of prescribed burns should be dictated more clearly and most likely should include a wider area than is currently being looked at. Especially considering that the negative impacts of PM 2.5 emissions can occur at a lower level than the EPA or CAL Fire is currently regulating for, even if smaller amounts of smoke travel to sensitive areas, that smoke could still be negatively impacting people and especially marginalized communities, since they are more likely to have underlying health conditions that exacerbate the negative health effects associated with smoke.<sup>37</sup>

The second problem with SSAs is which places and people are currently being considered in planning for prescribed burns as part of the SSA category. While the current SSA parameters include areas that are important to consider, it still leaves out specific marginalized

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<sup>35</sup>Jennifer Moore Myers, “Weather Conditions Inform Timing of Prescribed Fire,” CompassLive (Southern Research Station, April 18, 2019),

<https://www.srs.fs.usda.gov/compass/2019/04/18/weather-conditions-inform-timing-of-prescribed-fire/>.

<sup>36</sup>M.S Sargent and K.S Carter, “Landowner's Guide: Prescribed Burning,” Landowner's Guide: Prescribed Burning, December 30, 1999,

[https://www2.dnr.state.mi.us/publications/pdfs/huntingwildlifehabitat/landowners\\_guide/habitat\\_mgmt/grassland/Prescribed\\_Burning.htm](https://www2.dnr.state.mi.us/publications/pdfs/huntingwildlifehabitat/landowners_guide/habitat_mgmt/grassland/Prescribed_Burning.htm).

<sup>37</sup> Bowe, “Burden of Cause-Specific Mortality Associated With PM2.5”

populations. The three I will be advocating for immediate inclusion in the SSA category are prisons, farms and farmworkers, and homeless populations.

### ***Prisons***

The first concern in regards to prisons is their location. Using data from the US Forest Service as well as the Department of Homeland Security, an analysis by The Intercept found that California is the state with the most carceral facilities in locations with extreme wildfire risk at 90 facilities out of 410.<sup>38</sup> These facilities include jails, correctional centers and juvenile centers, all of which hold incarcerated people who must rely on the institution in which they are being held for protection from smoke exposure. The location of these facilities in places with extreme wildfire risk is concerning, not only for the risk from wildfires themselves but also because locations with extreme wildfire risk are where prescribed burns are most likely to take place.<sup>39</sup> Being in these locations but not being included in the smoke-sensitive groups that burn managers and others conducting burns are required to be aware of and exercise caution around means that people held in prisons are not being considered in prescribed burn planning, which could lead to dangerous health outcomes.

Another reason for including prisons in the SSA classification is that prison populations are much more likely to have underlying health conditions, including specific respiratory conditions that exacerbate the effects of smoke exposure the most. According to data from the National Inmate Survey in comparison with National Survey on Drug Use and Health, 44% of prisoners and jail inmates have a chronic condition, while only 31% of those in the general

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<sup>38</sup>Alleen Brown, “As Wildfires Threaten More Prisons, the Incarcerated Ask Who Will Save Their Lives,” The Intercept (The Intercept, February 12, 2022), <https://theintercept.com/2022/02/12/wildfires-prisons-climate-california/>.

<sup>39</sup>Dale Wade and Hugh Mobley, “Managing Smoke at the Wildland-Urban Interface,” United States Forest Service (Southern Research Center, June 2007), [https://www.srs.fs.usda.gov/pubs/gtr/gtr\\_srs103.pdf](https://www.srs.fs.usda.gov/pubs/gtr/gtr_srs103.pdf).

population do.<sup>40</sup> This gap in chronic conditions is also seen with respiratory conditions, as 15% of prisoners and inmates have asthma compared to 10% for the general population.<sup>41</sup> Respiratory conditions are particularly important indicators because the damage done by smoke exposure primarily affects the lungs. If they are already compromised by another health condition the effects of smoke exposure can be amplified.<sup>42</sup>

A final consideration that must be acknowledged when considering adding prisons as an SSA is the fact that prisons hold populations that, by virtue of being imprisoned, have far less freedom to protect themselves from smoke exposure. There is currently no system within the California carceral system for response to both smoke exposure and wildfires. In a poignant example from the 2020 fire season, a large wildfire in Vacaville spread to within a few miles of two different state prisons which were included in the initial evacuation orders but then removed in later orders even though the surrounding areas were evacuated.<sup>43</sup> Prisoners were never informed of any plan to evacuate. Only some were given masks for protection from smoke exposure, and the rest were left to suffer the effects of the smoke exposure.

As has been made clear by both the pandemic as well as wildfires and prescribed burns, prisoners are at the mercy of the state to be protected from events like this and without adequate protection they are a very vulnerable population. Including prisons in the SSA classification is only one of many steps that must be taken to protect incarcerated people, chief among those is to stop mass incarceration, but it is nonetheless an important step in limiting the smoke exposure that prisoners get.

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<sup>40</sup> Laura M Maruschak and Marcus Berzofsky, “Medical Problems of State and Federal Prisoners and Jail Inmates, 2011–12” (US Department of Justice, February 2015), <https://bjs.ojp.gov/content/pub/pdf/mpsfj1112.pdf>.

<sup>41</sup> Maruschak, “Medical Problems of State and Federal Prisoners”, 3.

<sup>42</sup> “How Smoke from Fires Can Affect Your Health,” EPA (Environmental Protection Agency, n.d.), <https://www.epa.gov/pm-pollution/how-smoke-fires-can-affect-your-health>.

<sup>43</sup> Sam Levin, “Severe Inhumanity’: California Prisons Overwhelmed by Covid Outbreaks and Approaching Fires,” *The Guardian* (Guardian News and Media, August 21, 2020), <https://www.theguardian.com/us-news/2020/aug/21/california-fires-prisons-covid-outbreaks>.

## *Farmworkers*

A second group that urgently needs to be added to the SSA protections is farmworkers. Farmworkers, by virtue of their profession, spend nearly all their time outside and frequently do not have adequate protection from smoke inhalation, even during circumstances outside of prescribed burns or wildfires. While farmworkers are employed across the state, an area with a particularly large population of farmworkers is the San Joaquin Basin in central California where an estimated 175,000 to 500,000 farmworkers work.<sup>44</sup> Unfortunately, this region is also home to the highest PM levels in the United States because it is one of the largest agricultural regions in the country and a wide range of farming practices are used which raise the PM levels. This means that these farmworkers are already being subjected to higher than usual levels of PM exposure and, as such, are already at risk before factoring in the effects of smoke exposure.

In recent years, new regulations have been put in place by CAL-OSHA with the goal of protecting farmworkers and other outdoor workers from PM exposure.<sup>45</sup> These regulations require employers to make high quality face masks that can filter out PM 2.5 particles available to all workers who are going to be exposed through their work. There are additional recommendations such as decreasing time outside but these are merely recommendations not requirements. The main issue with these new regulations is that they only come into effect when the AQI is above 150 or “unhealthy”.<sup>46</sup> Waiting until this level of PM 2.5 exposure is dangerous because not only does air quality start affecting sensitive groups at 100, not 150, but also because

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<sup>44</sup>Steven Cliff et al., “Airborne Particles in the San Joaquin Valley May Affect Human Health,” CORE, January 1, 2010, <https://core.ac.uk/display/201819869>.

<sup>45</sup>“Protecting Outdoor Workers Exposed to Smoke from Wildfires,” California Department of Industrial Relations (Division of Occupational Safety and Health, February 2021), <https://www.dir.ca.gov/dosh/wildfire/worker-protection-from-wildfire-smoke.html>.

<sup>46</sup> Kent Pinkerton, Anne Katten, and C. Bryan Little, “Perspectives on the Proposed Emergency Wildfire Regulation,” Western Center for Agricultural Health and Safety, July 3, 2019, <https://aghealth.ucdavis.edu/news/perspectives-proposed-emergency-wildfire-regulation>.

of the prolonged length of time that farmworkers spend outside. Farmworkers are already exposed to high levels of PM 2.5 exposure and so are more likely to have underlying conditions like asthma that qualify them to be included in the “sensitive” group in terms of AQI recommendations.<sup>47</sup> Additionally, the AQI scale was designed for people who are outside for only an hour or two, not for stretches of 8 or more hours at a time, and therefore are inhaling much less PM 2.5 than those who are outside for longer.<sup>48</sup> Both of these together mean that farmworkers are at higher risk of negative health effects because they are subjected to higher levels of exposure, not only from prescribed burns but also from their everyday exposure. They are not receiving adequate protection in either case.

The impact of climate change on farmworkers’ exposure risk must also be considered because, as advocates for farmworkers have warned, workers are expected to work in nearly all weather conditions including days when it is very hot.<sup>49</sup> Wearing an N95 mask for hours is not only inaccessible for workers when the AQI is not above 150 but also incredibly difficult and exhausting. For many workers, the long-term risk of health effects like respiratory infections or lung cancer are outweighed by the need to continue working as quickly as possible, since many are paid by the amount of work they do instead of on an hourly basis. This form of payment as well as the very low wages which farmworkers are paid both contribute to farmworkers' lack of choice for which weather conditions they work in, since they can not afford to lose a day of work and pay even for conditions like extreme heat or smoke exposure.<sup>50</sup>

The combination of higher everyday PM 2.5 exposure, insufficient government protection, and lack of control over work conditions mean that farmworkers are a significant

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<sup>47</sup> Steven Cliff et al., “Airborne Particles in the San Joaquin Valley May Affect Human Health,”

<sup>48</sup> Katten, “Perspectives on the Proposed Emergency Wildfire Regulation,”

<sup>49</sup> Liza Gross, “Fires Fuel New Risks to California Farmworkers,” Inside Climate News, September 21, 2021, <https://insideclimatenews.org/news/21092021/wildfires-california-farmworkers-smoke-health/>.

<sup>50</sup> Gross, “Fires Fuel New Risks to California Farmworkers,”

population that is at an elevated risk from smoke exposure. Adding farmworkers to the SSA classification would help protect farmworkers, a high-risk group, from additional smoke exposure.

### ***Homeless Populations***

Homeless encampments are also filled with at-risk populations that are mostly outdoors and do not have the resources to protect themselves against smoke exposure. While homeless populations are frequently thought of as being primarily in large metropolitan areas like Los Angeles or San Francisco, recent data comparing homeless populations from 2009 with 2018 shows that “homelessness in California is growing the most in many rural and suburban CoCs [Continuum of Care], while many suburban and urban CoCs, including major cities, have been able to decrease their homelessness count”.<sup>51</sup> These rural counties are seeing increases in both their homeless population and prescribed burns. Protections need to be put in place to address this added risk.

While shelters do offer some indoor access for homeless populations, many spend long hours if not all day outside with very limited options to go inside. One of the key prevention strategies for decreasing smoke inhalation and PM 2.5 exposure is simply to go inside, and in many cases, homeless populations do not have that option.<sup>52</sup> This means that they are in a similar position to farm workers where there is not an option to go inside; however, in this case there is not even an employer who is responsible for providing N-95’s under certain conditions. The effects of this lack of protection from being forced outdoors has been clear to researchers. One

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<sup>51</sup>“Where the Homelessness Population Is Increasing in California,” Laguna Treatment Hospital, March 9, 2022, <https://lagunatreatment.com/blog/homelessness-population-in-ca/>.

<sup>52</sup> Nathan Rott, “Study Finds Wildfire Smoke More Harmful To Humans Than Pollution From Cars,” NPR (National Public Radio, March 5, 2021), <https://www.npr.org/sections/health-shots/2021/03/05/973848360/study-finds-wildfire-smoke-more-harmful-to-humans-than-pollution-from-cars>.

study found that, among the Salt Lake City, UT homeless population, 89% had sought medical care for air pollution related health concerns, and this number did not change significantly based on length of time unhoused.<sup>53</sup> This means that within a relatively short time frame, unhoused populations already suffer negative effects from being outdoors for the majority of their time. These populations are in a precarious position because when smoke exposure does happen, they are more likely to suffer serious health effects since they have underlying health conditions from the everyday air pollution they are not being protected from.

There currently are not any protections in place on a state-wide level to ensure that homeless populations are protected during evacuations and prescribed burns, or from air pollution from other sources. Even in extreme conditions like wildfire evacuations, homeless populations are often ignored and not provided masks or help with evacuating. Expanding the SSA classification to include homeless encampments and shelters, as well as adding in protective measures to provide masks and indoor filtered spaces during burns and wildfires alike would help to mitigate the negative health consequences that an already high risk group is being exposed to.

### **Protections for Smoke Sensitive Groups**

Acknowledging and being aware that there are smoke sensitive groups, including those detailed above, in the area around a prescribed burn is important but awareness is not enough. Processes to preemptively prevent those groups from experiencing the negative effects of burns must also be implemented. Currently, protections for smoke sensitive groups and the general

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<sup>53</sup> Angelina L DeMarco et al., “Air Pollution-Related Health Impacts on Individuals Experiencing Homelessness: Environmental Justice and Health Vulnerability in Salt Lake County, Utah,” *International Journal of Environmental Research and Public Health* (MDPI, November 13, 2020), <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC7697557/>.

public essentially amount to trying not to let smoke go near them. In the event that the smoke, and the particulate matter that makes up that smoke, does reach sensitive groups, there is not a protocol for warning them or for helping lessen the impact of the smoke to the group. A number of steps must be taken, from creating the infrastructure to support alert systems to actions that need to be taken whenever there is a prescribed burn.

Currently, if private landowners want to do a burn, CAL Fire permits are only required during fire season and it is only a recommendation that private landowners conducting burns during the off-season even notify CAL Fire of the burn. A small step that would greatly help in the protection of communities from escaped prescribed fires as well as smoke exposure would be to require that landowners get a permit from CAL Fire for every burn regardless of whether it is during fire season or the off-season. This would allow CAL Fire to be aware of the burns occurring in the state on a given day, which would help in maintaining an accurate record of what burns are happening and where. Requiring permits for every burn would also allow CAL Fire to be better prepared to respond to escaped burns and monitor smoke levels in burn areas. This is especially important since the number of prescribed burns being done during the off-season will be increasing in order to meet the state's goals. Therefore, more and more burns will be happening without CAL Fire supervision unless this is enacted.

In addition to requiring private landowners to get a permit from CAL Fire to conduct a burn, a public statewide identification system for who is conducting the burns should be created. This would allow the community as well as the state to be aware of who is conducting the burns and provide a way to hold burners accountable. If there is a particular landowner or burn manager who is not listening to the needs of the community, then the community should know who they are in order to demand the state hold them accountable.

In addition to getting community feedback, the state of California must also create its own independent review process for establishing what levels of air pollution are safe. This review board would need to be made up of scientific experts but should also include community members including tribal representatives, community activists, farmworker representatives, and other marginalized groups. Having this review board would allow the state to update the PM 2.5 emissions limit more rapidly as the science evolves rather than depending on the political will of the federal government to decide when and what to change the air quality standards to. Having representatives from different community members on the board would also allow a space for feedback from the communities being affected by these emissions. This would give the state the opportunity to enact more stringent requirements since, as mentioned above, the current requirements for PM 2.5 emissions are still allowing members of marginalized communities in particular to suffer and even die from too much PM 2.5 exposure even at levels considered “safe” by the federal government’s current standards.<sup>54</sup>

An independent state process is also necessary given the current state of national politics. Even as science evolves and raises concerns about the current regulations, politics can still prevent new regulations from being issued on a national scale. In a recent example of this tension between science and politics, in June 2021 the Biden administration announced that it would be reconsidering the decision made by the Trump administration to not adjust the 2012 regulations for PM levels. The EPA is in charge of reviewing the National Ambient Air Quality Standards (NAAQS) hypothetically every five years though it most often occurs when there are lawsuits against the standards arguing that they need to be changed.<sup>55</sup> These EPA standards are then used to create environmental standards across the US, including in California, as part of the prescribed

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<sup>54</sup> Bowe, “Burden of Cause-Specific Mortality Associated With PM2.5”

<sup>55</sup>“Air Quality, Wildland Fire, and Smoke Management in the US,” The Nature Conservancy (Global Fire Initiative, n.d.), [https://www.conservationgateway.org/Documents/air\\_and\\_fire\\_final.pdf](https://www.conservationgateway.org/Documents/air_and_fire_final.pdf).

burn regulations so if they are outdated that affects not just federal regulations but state and local regulations as well. California needs to move forward with a freestanding process not beholden to the national government.

In terms of infrastructure, the EPA already has air quality monitors throughout the state. The data is publicly available through the AirNow website and is differentiated into ozone exposure and PM exposure.<sup>56</sup> These air quality monitors are regulatory grade, maintained by professionals, and provide very accurate readings of the amount of PM 10 and PM 2.5 in an area. In addition to utilizing these already existing air quality monitors, the state should look at the places that they, or private landowners, have already done burns and are planning to do them in the future, as well as places that have smoke sensitive groups, and add air quality monitors to any gaps. In addition to these regulatory-grade sensors, lower-quality, less expensive, air monitors are being piloted in the state by the EPA to see if they can provide accurate enough air quality data when a large number are used so if the results of that pilot indicate that cheaper air monitors are also usable then the state could alternatively install a large number of those across communities to ensure as wide coverage as possible.<sup>57</sup> The purpose of this infrastructure investment is to have accurate data with which to make policy decisions as well as help give citizens accurate and up-to-date information about their risk levels.

In addition to a statewide network of air quality monitors, steps must be taken by the state and local governments within a particular community before a burn. In areas identified as targets for prescribed burns, supplies like N95 masks must be disseminated to the community that the burn is going to take place in. These should be given to the community at large but should also

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<sup>56</sup> “About AirNow,” About AirNow | AirNow.gov (AirNow.gov, U.S. EPA, n.d.), <https://www.airnow.gov/about-airnow/>.

<sup>57</sup> K Johnson et al., “Air Sensors: PurpleAir, Airnow Fire and Smoke Map, and Their Use Internationally,” EPA (Environmental Protection Agency, December 3, 2020), [https://cfpub.epa.gov/si/si\\_public\\_record\\_Report.cfm?dirEntryId=350379&Lab=CEMM](https://cfpub.epa.gov/si/si_public_record_Report.cfm?dirEntryId=350379&Lab=CEMM).

be specifically targeted at marginalized groups and smoke sensitive groups, including those mentioned above, since those are the people most likely to experience negative health effects from the PM 2.5 exposure.

In the days and weeks before a burn is going to take place, people should be alerted that there will be a prescribed burn in their community. While this currently means the homeowners whose property borders the place where the prescribed burn is being done, it must include all groups within a community since its clear smoke exposure can occur over much larger geographic areas than just the neighboring properties. These alerts must be made in a variety of ways and languages and should be specific to the needs of the local community. Alerts on social media, flyering, postcards, or outreach to community organizers, local government, or local organizations are all valid routes for communication as long as every effort is made to alert members of the community and special effort is made to alert marginalized community members.

While a prescribed burn is occurring, community members should be alerted if the PM 2.5 levels rise above healthy levels. This could be accomplished in a few different ways based on the level of concern. Air quality levels, which include PM 2.5 levels, above 100 are considered unhealthy, with between 100 and 150 being unhealthy for sensitive groups, such as those with underlying health conditions, while above 150 is considered unhealthy for everyone.<sup>58</sup> Having air monitors with publicly available data means that community members who have access to the internet can check the air quality levels at any time. This does, however, require people to check the air quality levels in order to be aware. Thus, if air quality levels are between 100-150 then smoke sensitive groups should be alerted and protocols should be in place to start protecting

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<sup>58</sup> “Air Quality Index (AQI) Basics,” AQI Basics | AirNow.gov (AirNow.gov, U.S. EPA, n.d.), <https://www.airnow.gov/aqi/aqi-basics/>.

those communities as soon as the air quality gets to that level. If air quality levels rise to above 150 then the alerts should be sent to the entire community since the air quality is now dangerous for everyone not just those with underlying conditions.

Alerts to specific communities will have to be done based on the smoke-sensitive groups that are present in the community and the kind of existing community organizing that can be utilized. This could look like phonebanking, social media posts, canvassing, or whatever the local community decides is the best route to take. Alerts to the community at large can utilize existing infrastructure in the form of Wireless Emergency Alerts.<sup>59</sup> WEAs are already sent to mobile devices like cell phones or pagers to alert communities based on their location of events like flash floods, tornado warnings, or other natural disasters. Using these to alert community members to unsafe air quality levels would allow people to take action to limit their exposure. WEAs would be useful not only for prescribed burn smoke exposure but also during wildfires or other causes for bad air quality days.

Along with alerts and masks dispersal to the community, additional measures must be taken to protect all smoke sensitive areas. I will outline specific steps that should be taken in regard to the groups mentioned above, since they are not currently included in the Smoke Sensitive Area classification but still need significant protective measures but measures like these can also be applied to the current SSA groups.

Prisoners are cut off from the larger community in which they reside, so it is essential that there are systems put in place by the state government and maintained to provide prisoners with air quality alerts, information about smoke exposure and the health effects, masks, as well as any other safety measures that are being offered to the broader community. Without these systems,

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<sup>59</sup> “Wireless Emergency Alerts (WEA),” Federal Communications Commission, April 18, 2022, <https://www.fcc.gov/consumers/guides/wireless-emergency-alerts-wea>.

prisoners have very little ability to protect themselves from smoke exposure, a risk compounded by the underlying health conditions that are prevalent within prison populations. Currently, there is no requirement for prisoners to be provided with any protective materials in the case of unhealthy AQI levels. The instatement of policies that are triggered by AQI levels reaching 100, the unhealthy level for sensitive groups including those with respiratory or cardiac health conditions, is necessary to offer protection for those sensitive groups since those populations are present in a large proportion in prisons.

These measures, like providing masks, are important even for those who are not in a sensitive group because prisons lack sufficient ventilation or air filtration. In some places even basic measures like air conditioning, which keep smoke from building up, are not available to prisoners.<sup>60</sup> At the same time a lack of air conditioning means that prisoners are facing the same conditions that make it so difficult for farm workers to keep N95 masks on even when they are provided. Wearing an N95 in a cell that can easily reach temperatures of over 100 degrees in certain parts of the state during the summer is exhausting. In many cases, N95 use would not be feasible for a long period of time if AQI levels take a few days to subside.

All of these factors together mean that the most feasible and cost-effective option for the state is to shut down as many prisons as possible, prioritizing those without air conditioning and adequate ventilation that are located in areas with extreme wildfire risk. This would not only save the state money in terms of the measures it would need to take in order to make these prisons marginally safer from smoke exposure but also save the costs that the state is currently taking on with the costs of health conditions that are exacerbated by both intense heat conditions

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<sup>60</sup>Victoria Law, “You’re Cooking in There’: Every Summer, Those Behind Bars Face Triple-Digit Temperatures,” Rewire News Group, August 22, 2017, <https://rewirenewsgroup.com/article/2017/08/22/youre-cooking-every-summer-behind-bars-face-triple-digit-temperatures/>.

as well as from smoke exposure or a combination of all of the above. This paper outlines the issues that prescribed burns and smoke exposure present to prison populations but does not account for the host of other problems that face prisons so the scope of this paper can only argue for the closing of the prisons meeting the above characteristics but that does not support the continued operation of prisons outside of this.

Looking to another category of marginalized people in need of stronger protections, farmworkers are currently somewhat more protected under California work regulations, but there is still significant room for improvement. As mentioned above, the current regulations do not require businesses to enact any health and safety protections until the AQI levels are above 150. Even then, the only requirement is that they provide N-95's when requested, unless the AQI goes above 500, in which case N-95's become required but farmworkers can still be required to continue working. This clearly represents a health concern especially since farmworkers are paid poverty wages that require them to work regardless of how unsafe conditions are because of the pay structure they are stuck in. The state needs to step in and prevent farmworkers from being forced to continue working in these conditions while also ensuring that their pay is not docked. This is the key with any solutions to the current conditions in which farmworkers are forced to keep working in unsafe conditions. Failure to ensure that farmworkers are receiving payment will mean that any solution will just exacerbate the poor living conditions that farmworkers already find themselves in instead of improving their living and working conditions like intended. This makes the situation difficult so I will not presume to offer a complete solution but to offer some potentials instead.

A first step is to lower the AQI level at which employers must provide N-95's from 150 to 100, given the extended time the farmworker population spends outside and their

predisposition to underlying health conditions. The second is to prohibit outdoor work at AQI levels above 300. On the AQI scale, levels between 300 and 500 are considered hazardous and, according to the EPA, “everyone should *avoid all* physical activity outdoors” .<sup>61</sup> This is a clear break between CAL-OSHA regulations for workers and the federal and state standards for acceptable AQI exposure. Even as the EPA advocates for complete termination of outdoor activity, CAL-OSHA continues to allow businesses to let their workers work outside without required masking, in air pollution levels considered unhealthy for everyone else to even go outside.<sup>62</sup> Masking does not even become required until levels are at 500, which is the upper limit of the AQI scale. Even then, businesses are still technically allowed to require workers to continue working outdoors as long as they have masks on. This state of affairs is unacceptable and represents a true breakdown between public health and public policy.

The state must also create legislation that protects workers’ wages during times when the AQI does exceed 300 so that farmworkers are not forced to pay the price for the probable increase in days with high air pollution as a result of wildfires, climate change, or prescribed burns. This could come in the form of additional state mandated sick leave days modeled after measures passed to address the COVID-19 pandemic or through a system in which workers’ wages are either covered by the state or by the businesses themselves on days in which the air quality is unsafe. There are a variety of ways in which this pay can be compensated, but it is essential that compensation occurs in a way that protects farmworkers from being forced into working outside when the air quality is unsafe. The current regulations leave too much space for businesses to force workers to continue working despite the unhealthy air pollution. These

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<sup>61</sup>“Patient Exposure and the Air Quality Index,” EPA (Environmental Protection Agency, n.d.), <https://www.epa.gov/pmcourse/patient-exposure-and-air-quality-index>.

<sup>62</sup>“§5141.1 Protection from Wildfire Smoke,” California Code of Regulations, Title 8, Section 5141.1. Protection from Wildfire Smoke., February 1, 2021, [https://www.dir.ca.gov/title8/5141\\_1.html](https://www.dir.ca.gov/title8/5141_1.html).

loopholes must be changed as soon as possible, since every exposure to PM pollution increases the danger of negative health consequences.

However, these solutions do run into the issue of protecting undocumented workers who still need protection but are left out of the state's current social safety net.<sup>63</sup> The key change that needs to be made here is to provide a pathway for undocumented farmworkers to become citizens or permanent residents with the ability to access social safety nets. Legislation that would accomplish this has been introduced in the Senate by Senator Alex Padilla (D-CA) as the *Citizenship for Essential Workers Act*. This would create a pathway to citizenship for essential workers including undocumented farmworkers, who make up a large percentage of the agricultural work force.<sup>64</sup> Passing this, or similar legislation, would undocumented farmworkers easier access to the benefits that this paper aims to give all farmworkers regardless of immigration statues. Anything short of citizenship or permanent residency will leave undocumented workers outside of the protections that they need in order to mitigate the harmful effects of PM 2.5 exposure. Proposing specific citizenship pathways is outside the scope of this paper and instead this is meant to highlight another factor that shows the need for an immediate change to our current immigration laws.

The final population that needs to be addressed here is the homeless populations, which are also at great risk from smoke exposure. In line with ensuring access to masks for the community, homeless community members must be targeted for mask distribution because of both higher levels of underlying health conditions and outdoor exposure to air pollution within

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<sup>63</sup>Caius Z Willingham and Silva Mathema, "Protecting Farmworkers from Coronavirus and Securing the Food Supply," Center for American Progress, April 23, 2020, <https://www.americanprogress.org/article/protecting-farmworkers-coronavirus-securing-food-supply/>.

<sup>64</sup>"Padilla Announces Pathway to Citizenship for Essential Workers in First Bill as Senator," Senator Alex Padilla, February 26, 2021, <https://www.padilla.senate.gov/newsroom/press-releases/padilla-announces-pathway-to-citizenship-for-essential-workers-in-first-bill-as-senator/>.

that community. Additionally, emergency shelters should be opened in areas with AQI levels over 300 to again ensure that no one is left outdoors when the pollution levels are that high. These are already being piloted in some areas of the state through county or city initiatives but the state as a whole is lacking a strong program to provide these. Funding for a pilot state program was approved in October 2019 by the Governor but as of the publication of this paper only two air quality districts had begun to accept applicants for receiving this funding.<sup>6566</sup> Additionally, these programs are centered around metropolitan areas and are noticeably lacking in more rural counties which is where the greatest risk to homeless populations from both wildfire and prescribed burn smoke exposure is. Creation of the state-wide program must be expedited and pilots targeted at rural counties need to be included as quickly as possible to protect those growing homeless populations.

## **Conclusion**

The threat of wildfires has increased enormously over the past decade in California. Dry conditions exacerbated by climate change have collided with poor forest management to create a dire situation for the state and its inhabitants. One of the state's proposed solutions to this issue is to increase the number of acres of land that are treated with prescribed burns to try and rectify the immense build-up of fuel that has occurred over the last 100 years. This paper examined the effects that the increase in prescribed burns is having on marginalized communities in California, which include imprisoned populations, farmworkers, and homeless populations. The increase in prescribed burns is causing an increase in PM 2.5 emissions that represents a significant danger

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<sup>65</sup>Buffy Wicks, "AB-836 Wildfire Smoke Clean Air Centers for Vulnerable Populations Incentive Pilot Program," AB-836 Wildfire Smoke Clean Air Centers for Vulnerable Populations Incentive Pilot Program (California Legislative Information, October 2, 2019),

[https://leginfo.legislature.ca.gov/faces/billTextClient.xhtml?bill\\_id=201920200AB836](https://leginfo.legislature.ca.gov/faces/billTextClient.xhtml?bill_id=201920200AB836).

<sup>66</sup>"Wildfire Smoke Clean Air Center Grant Program," California Air Resources Board, accessed April 28, 2022, <https://ww2.arb.ca.gov/our-work/programs/wildfire-smoke-clean-air-center-grant/grant-programs>.

to everyone, and, in particular, populations that cannot easily protect themselves from exposure and have higher proportions of underlying health conditions. All three populations listed above fall under this category. This increase in fires and correlative increase in risk means that the state must take actions to ensure that it protects these communities while aiming to achieve its fire and forest management goals.

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