April 26, 2025

VIA EMAIL (PublicComments@bof.ca.gov)

Zone Zero Regulatory Advisory Committee
California Board of Forestry and Fire Protection
Natural Resources Building
715 P Street
Sacramento, CA 95814

Re: Defensible Space Zone 0 and Vegetation/Trees

Dear Committee Members:

This letter offers comments on the April 7, 2025 draft of the Zone 0 regulations proposed to be established under Public Resources Code § 4291, elaborating on input made by Dr. Travis Longcore during the April 7, 2025 hearing. Thank you for your patience and openness to new information during that interactive workshop.

We are concerned that the process leading to the development of the draft Zone 0 regulations did not adequately include scientists and experts on the environmental consequences and expected efficacy of the proposed actions who might have provided deeper scientific perspective on the positions advanced by fire officials and the insurance industry. In reviewing the materials posted on the committee's website (https://bof.fire.ca.gov/projects-and-programs/defensible-space-zones-0-1-2/), it appears that a review of relevant scientific literature is lacking. Such a review is essential to guide the substantial cost–benefit exercise that should be undertaken before adopting regulations so far-reaching, expensive, and intrusive as the proposed Zone 0 regulations.

Structure Loss Studies Do Not Support Elimination of All Vegetation in Zone 0

As mentioned in the workshop, post-fire assessments undertaken in southern California do not support the assertion that a "Zone 0" must be kept entirely free of vegetation to protect structures.

- Syphard et al. (2012) evaluated structure loss in San Diego County and the western Santa Monica Mountains, finding that loss was greatest at low to intermediate structure density, for structures dispersed in wildlands, and for those at urban–wildland edges. Subsequent research shows that this does not hold true in *urban* conflagrations, where proximity to the nearest structure is the strongest predictor of loss (see discussion in Mockrin et al. 2023). The study did not address Zone 0.

- Syphard et al. (2014) studied 2,000 homes, split between those that were lost in a fire footprint and those that survived. At the parcel scale, structure loss was reduced by vegetation management (not removal) within 32 ft from structures for gentle slopes and 65 ft for steeper slopes. "Defensible space" in the study specifically allowed the presence of trees, but found an increased statistical risk when trees were overhanging a structure. According to Dr. Jon Keeley, this risk is a result of tree litter accumulating on roofs, and

is not an intrinsic risk from trees catching fire (pers. comm., and see Keeley et al. 2013). The study does not provide support for complete elimination of vegetation in Zone 0.

- In an analysis of the Cedar Fire, San Diego County, Alexandre et al. (2016) did not find that vegetation amount near buildings was predictive of structure loss but rather the connectivity of wildland vegetation, topography, and clustering of buildings were important factors. Elimination of vegetation in Zone 0 is not supported by this study.

- In a subsequent San Diego County study, Syphard et al. (2017) found that the combined power of building materials (home hardening) and defensible space (without total vegetation removal) in explaining structure loss was only 14% of the overall variation. Home hardening and defensible space were equally important in contributing to the relatively small influence of these site characteristics. The study found some support for an influence on structure loss of the number of sides of a building touching vegetation, but this factor was far less important than structure density, structure age, percent clearance within 100 ft, slope, overhanging vegetation (because of accumulation of leaf litter), and distance to a major road. Complete elimination of vegetation in Zone 0 is not supported by this study.

- Looking at the Thomas Fire in Ventura County, Uribe (2021) found that more irrigated landscape within 100 ft of structures reduced the risk of loss. Although Uribe found that nonburnable land cover within 5 ft of structures reduced loss probability, presence of oak woodland specifically, or vegetation generally, in this zone did not increase risk of structure loss. That is, elimination of vegetation in Zone 0 is not supported by this study. Uribe did find a significant risk associated with wood fences in the 0–5 ft zone.

- Mockrin et al. (2023) studied the Woolsey Fire in the Santa Monica Mountains and found that vegetation around buildings explained very little about probability of structure loss, while proximity of the nearest building was positively correlated with loss. Vegetation immediately surrounding buildings was considered as a factor but did not even make it past the first significance screening to be further investigated. Elimination of vegetation in Zone 0 is not supported by this study.

In the April 7 workshop, there was some language "creep" by participants attempting to define Zone 0 as a "non-combustible" zone rather than an "ember-resistant" zone as defined in AB 3074 (adopted in 2020). Non-combustible would suggest no vegetation or other burnable material, while ember-resistant certainly allows for healthy, well-maintained vegetation because it is full of water, unlike other more easily ignited items, such as wood mulch. Preliminary evidence from the Eaton and Palisades fires suggests that, in countless instances, the vegetation in Zone 0 was ignited by the structures on fire, and not vice versa. Furthermore, the studies of structure loss simply do not provide evidence that complete vegetation removal is required. Reduction in vegetation mass within 100 ft of structures decreases likelihood of loss, but only up to about 40% reduction in cover; beyond that, there is no benefit (Syphard et al. 2014). To quote Syphard et al. (2014), "… percentage clearance need not be draconian to be effective. Even on

steep slopes, the effective percent clearance needed on the property was <40%, with no significant advantage beyond that."

These post-fire studies are capable of detecting features that are important to structure loss and therefore would have strong scientific support to be included in Zone 0, such as the presence of flammable fences (Uribe 2021). If there were a strong benefit of vegetation removal in the first 10 ft around structures, it would have come to light in the Mockrin et al. (2023) study. In their words, "Despite detailed pre-fire information on vegetation around nearly 11,000 buildings, we did not find a critical role for vegetation in defensible space in relation to building outcomes after the Woolsey Fire. Instead, building materials and landscape attributes were higher-ranking in variable importance."

Proposed Rule Ignores Protective Effect of Healthy Vegetation

The advisory committee does not appear to have heard from scientists who have concluded that some vegetation, especially fire-resistant native oak species and perhaps species such as Deodar Cedar, protect structures from fire by intercepting embers and altering where embers land. That is, healthy, well-maintained vegetation may serve as buffers against flying embers (Gill 2005, Moritz et al. 2014, Keeley and Syphard 2019). This hypothesis has been suggested in studies in Australia, California, and Alaska (Wilson and Ferguson 1986 as cited by Syphard et al. 2014, Gibbons et al. 2018, Schmidt et al. 2024). The benefits of oaks in stopping fire spread have also been stated clearly by public agencies such as the Resource Conservation District of the Santa Monica Mountains (see https://youtu.be/tKc66QITkr8). To read the draft rules, one would think that all vegetation combusts and burns faster than structures. To the contrary, well-maintained and hydrated vegetation has much higher moisture content than structures and is more fire resistant than structures, as has been obvious in post-fire reviews in California, including the rapid assessments from the Eaton and Palisades fires. It has also been observed that removing healthy trees around structures increases the uninterrupted flow of embers in wind-driven fire conditions and the subsequent accumulation of embers downwind at structures and therefore represents an increased, not decreased, risk (Keeley and Syphard 2019). The physical mechanism is clear — live vegetation is full of water, and it is much more difficult to ignite than it is to ignite materials that have very low moisture content, such as homes and wooden fences.

Removing all healthy vegetation surrounding structures also opens an ecological vacuum in which the ubiquitous and aggressive invasive annual grasses, which are rapidly expanding (Syphard et al. 2022), will invariably colonize. These grasses are flashy fuels and highly ignitable for most of the year, and therefore pose a much greater risk of ignition if an ember lands near the structure than live woody vegetation with higher fuel moisture (Keeley et al. 2005, Fusco et al. 2022). These plants grow, die, and cure in early spring every year, and thus require more frequent maintenance from property owners to avoid increased risk.

We note a recent study claiming to show that privacy hedges burn with such intensity that they threaten adjacent structures (Tihay-Felicelli et al. 2025). But when one reads the paper, one discovers that the authors did not study a live hedge full of moisture, but rather constructed a "hedge" on a metal frame from branches that they had dried in the sun for 10 to 15 days, so that the moisture content of the branches was 8–22%. This is consistent with the moisture level of

hay. The lowest moisture content of live chaparral vegetation during an extreme drought is 60% (see https://fire.lacounty.gov/wp-content/uploads/2025/02/All-Areas-Graph.pdf), so this study provides absolutely no insight into role of healthy vegetation in a real-world scenario.

Another study purporting to address the effect of Zone 0 on structure survival was recently released as a preprint/working paper before peer review (Gollner et al. 2025). This investigation does not appear to have incorporated the benefits of well-maintained vegetation around structures. The manuscript addresses five historical fires in different locations in California and uses both a fire spread model and machine learning to attribute risk factors to structure survival. The posted draft of the manuscript does not contain necessary methodological details to understand the results relative to Zone 0. It does not provide any details about how vegetation is measured in each defensible space zone (e.g., whether as categorical or continuous variables) or how these values are incorporated into their fire model (ELMFIRE) and associated machine learning workflow. Furthermore, it does not provide information showing that realistic values are used for vegetation moisture in the fire model underlying the analysis. In the fire model, the default assumption is that woody vegetation has 60% moisture, and that herbaceous vegetation has 30% moisture (see https://elmfire.io/user_guide/io.html). These numbers, especially the 60% for woody vegetation, are unrealistically low for landscaping within 5 ft of structures. More typical live fuel moisture levels for irrigated trees and shrubs would be 120–300%. These moisture levels resist fire spread (see https://www.nwcg.gov/publications/pms437/fuel-moisture/live-fuel-moisture-content). If the fire model does not use realistic moisture content estimates for vegetation, its predictions about the benefits of home hardening and vegetation management will not be correct. Furthermore, the paper does not include a separate assessment of Zone 0, but rather only evaluates the effects of Zone 0 vegetation removal on predicted structure loss in combination with complete and total implementation of a full range of home hardening actions, confounding the two variables. That is, there is no evaluation of the separate implementation of Zone 0 without home hardening, an omission that would be compounded by the possible incorrect assumption that Zone 0 vegetation has 60% moisture content instead of 120–300%.

Industry White Papers on Zone 0 Lack Necessary Statistical Rigor

The advisory committee heard a presentation from a representative of the insurance industry presenting what she purported to be the science supporting Zone 0. In that presentation, there were illustrations of demonstrations meant to prove a point (e.g., a wooden fence showered with sparks), ad hoc observations following fires (but lacking statistical analysis of their importance), and reference to two industry white papers. We were able to obtain one of the two white papers ("Wildfire Fuel Management and Risk Reduction: Where to Start?") and reviewed a detailed description of the other ("Predictive & Transparent Wildfire Risk Analytics for the Insurance Industry") that included a description of the methodology. The two white papers present raw correlations between amount of vegetation cover within 5 ft of structures and subsequent losses or insurance claims. This approach is fatally flawed in that it does not prove causation, nor does it identify the individual contribution of vegetation with the 0–5 ft zone compared with all other factors contributing to fire losses. The scientific studies discussed in the bullets above identify the relative contribution of each factor, which is essential for a study to have statistical validity relative to the importance of each factor. The two industry white papers presented to the

advisory committee might have interesting underlying data, but neither contains a robust or reproducible statistical approach that would allow one to draw any conclusion about the independent contribution of vegetation in Zone 0, let alone to use as the basis of policy affecting millions of structures and properties across California.

A More Flexible Approach to Vegetation in Zone 0 Is Warranted

The Board is obligated by AB 3074 to develop a rule for Zone 0, but both the plain language and intent of the law allow for considerably more flexibility and appreciation of the tradeoffs involved than the current draft.

In AB 3074, the legislature was clear in its intent for flexibility in the creation of the ember-resistant zone, explicitly adopting the following guidance:

1. That the Board should "pursue collaborative approaches to achieve compliance with new defensible space requirements, taking into account property owners' financial resources and the scope of work necessary to achieve compliance."
2. That enforcement actions would be taken as a "last resort" for existing structures.
3. That the ember-resistant zone would eliminate materials "that would likely be ignited by embers." The legislature did not say "all vegetation," so it can be presumed that it contemplated vegetation remaining within this zone.
4. That the guidance document produced would include "regionally appropriate vegetation management suggestions that preserve and restore native species that are fire resistant or drought tolerant, or both, minimize erosion, minimize the spread of flammable nonnative grasses and weeds, minimize water consumption, and permit trees and shrubs near homes for shade, aesthetics, and habitat." This further indicates the legislature meant for the Board of Forestry and Fire Protection to balance these benefits against fire safety.

The draft rule as discussed on April 7, 2025 appears to be inconsistent with the intent of the legislature. It also would result in substantial environmental impacts throughout the State if adopted as currently proposed because of the loss of tree and shrub cover and the associated impacts on biodiversity (Longcore 2003), temperatures, humidity, erosion, water quality, public health outcomes, and personal security through loss of screening vegetation.

Recommendations

We offer the following specific comments to reduce the environmental impacts of the proposed rule. The California Environmental Quality Act requires selection of the least damaging environmental alternative that achieves project goals and, as a discretionary project with a certain adverse environmental impact, an assessment and honest consideration of alternatives is necessary.

- **The Board should allow healthy, well-maintained vegetation within Zone 0, including trees.** Well-maintained vegetation under most circumstances poses less ignition risk than the risk from adjacent structures in urban areas, where buildings are often less than 10 ft apart. To remove healthy, well-maintained vegetation in these

scenarios is an ineffectual diversion and does not increase safety or the ability to make structures more defensible. If the Legislature intended that all vegetation be removed, it could have stated so. It would be reasonable for the Board to ban certain highly flammable plant species in Zone 0 and Zone 1, such as junipers and cypress, which cannot be maintained to be ember-resistant. It would be appropriate to leave discretion for local inspectors to identify true hazards and balance interests to achieve the other required goals of reducing erosion and allowing for trees and shrubs for "shade, aesthetics, and habitat," as directed by the legislature.

- **The Board should move away from a one-size-fits-all approach.** As shown by the post-fire studies from southern California, it is the density of structures and their location on the landscape that primarily affect structure survival, with the risk having been determined long ago by location, planning, and zoning (i.e., topography, lot size, setbacks between houses). An urban area in chaparral vegetation should not be treated the same as a rural setting in a coniferous forest—the strategies to reduce fire risk are not the same and the risks are inherently different.

- **There is no rational basis to allow vegetation in pots but not planted in the ground.** If vegetation in pots is allowed, then vegetation in the ground must also be allowed. One cannot rely on the assumption that potted plants will be moved in an evacuation situation. Occupants probably would have more pressing concerns during an emergency or may not even be home. The limit of 18 inches also is arbitrary and not supported by any data.

- **The exception for existing trees in Zone 0 is flawed and should be improved.** The exception for existing trees is vague and would result in the eventual elimination of Zone 0 trees at great environmental impact. What would the "adjacent" structure be? How would height on slopes be measured? What happens around multifamily or institutional buildings where no tree would ever reach the building height? The exception is not workable as written and would result in the wanton destruction of trees around tall structures and in hilly terrain. We are already seeing substantial and regrettable reductions in urban forest cover through premature compliance with this Zone 0 concept. Because the threat from trees is the accumulation of leaf litter, the draft rule should not increase the distance tree limbs need to be kept away from roofs and ridgelines to 10 ft. The proposed language requiring that "The roof and rain gutters of a Building or Structure shall be kept clear of leaves and needles," is sufficient to address this hazard.

- **The rulemaking should not create a new zone in the first 5 ft of Zone 1 (5–10 ft from structure) to require that vegetation be kept below 2 ft tall.** Such a requirement would be devastating for the many small lots in more densely populated areas where it would result in the elimination of most vegetation on a parcel. SB 504, as the enabling legislation to change Zone 1, does not authorize creation of a new zone. It states, "The regulations may also alter the fuel reduction required between 5 and 30 ft to integrate the ember-resistant zone into the requirements of this section." The law contemplates changes that apply to the 5–30 ft zone, not the creation of "Zone 0.5."

We believe that the Board is required to consider alternatives that are less environmentally damaging than the proposed rule and that the scientific literature referenced herein provides the basis for the Board to allow healthy, well-maintained vegetation in Zone 0 to create an ember-resistant zone as required by law.

We are available to present this material to the advisory committee in a webinar format and answer any questions. Dr. Longcore can be reached at (310) 247-9719 or longcore@urbanwildlands.org. We understand the need to take science-based steps to reduce risk of structure loss and to ensure the safety of firefighters during a wildland fire. These steps, however, must be balanced against their costs, and the supporting evidence must be strong when drastic changes are being proposed.

Sincerely,

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References

Alexandre, P. M., S. I. Stewart, M. H. Mockrin, N. S. Keuler, A. D. Syphard, A. Bar-Massada, M. K. Clayton, and V. C. Radeloff. 2016. The relative impacts of vegetation, topography and spatial arrangement on building loss to wildfires in case studies of California and Colorado. Landscape Ecology **31**:415–430.

Fusco, E. J., J. K. Balch, A. L. Mahood, R. C. Nagy, A. D. Syphard, and B. A. Bradley. 2022. The human–grass–fire cycle: how people and invasives co-occur to drive fire regimes. Frontiers in Ecology and the Environment **20**:117–126.

Gibbons, P., A. M. Gill, N. Shore, M. A. Moritz, S. Dovers, and G. J. Cary. 2018. Options for reducing house-losses during wildfires without clearing trees and shrubs. Landscape and Urban Planning **174**:10–17.

Gill, A. M. 2005. Landscape fires as social disasters: an overview of 'the bushfire problem'. Environmental Hazards **6**:65–80.

Gollner, M., M. Zamanialaei, D. San Martin, M. Theodori, D. Purnomo, A. Tohidi, C. Lautenberger, A. Trouve, and Y. Qin. 2025. Isolating the primary drivers of fire risk to structures in WUI regions in California. Research Square **doi: 10.21203/rs.3.rs-5776626/v1**.

Keeley, J. E., M. Baer-Keeley, and C. J. Fotheringham. 2005. Alien plant dynamics following fire in Mediterranean-climate California shrublands. Ecological Applications **15**:2109–2125.

Keeley, J. E., and A. D. Syphard. 2019. Twenty-first century California, USA, wildfires: fuel-dominated vs. wind-dominated fires. Fire Ecology **15**:24.

Keeley, J. E., A. D. Syphard, and C. J. Fotheringham. 2013. The 2003 and 2007 wildfires in Southern California. Pages 42–52 *in* S. Boulter, J. Palutikof, D. J. Karoly, and D. Guitart, editors. Natural Disasters and Adaptation to Climate Change. Cambridge University Press, Cambridge.

Longcore, T. 2003. Ecological effects of fuel modification on arthropods and other wildlife in an urbanizing wildland. Pages 111–117 *in* K. E. M. Galley, R. C. Klinger, and N. G. Suguihara, editors. Proceedings of Fire Conference 2000: The First National Congress on Fire Ecology, Prevention and Management. Tall Timbers Research Station, Tallahassee, Florida.

Mockrin, M. H., D. H. Locke, A. D. Syphard, and J. O'Neil-Dunne. 2023. Using high-resolution land cover data to assess structure loss in the 2018 Woolsey Fire in Southern California. Journal of Environmental Management **347**:118960.

Moritz, M. A., E. Batllori, R. A. Bradstock, A. M. Gill, J. Handmer, P. F. Hessburg, J. Leonard, S. McCaffrey, D. C. Odion, T. Schoennagel, and A. D. Syphard. 2014. Learning to coexist with wildfire. Nature **515**:58–66.

Schmidt, J. I., M. Berman, and C. F. Waigl. 2024. Avoid getting burned: lessons from the McKinley wildfire in rural Alaska, USA. International Journal of Wildland Fire **33**:WF24014.

Syphard, A. D., T. J. Brennan, and J. E. Keeley. 2014. The role of defensible space for residential structure protection during wildfires. International Journal of Wildland Fire **23**:1165–1175.

Syphard, A. D., T. J. Brennan, and J. E. Keeley. 2017. The importance of building construction materials relative to other factors affecting structure survival during wildfire. International Journal of Disaster Risk Reduction **21**:140–147.

Syphard, A. D., T. J. Brennan, H. Rustigian-Romsos, and J. E. Keeley. 2022. Fire-driven vegetation type conversion in Southern California. Ecological Applications **32**:e2626.

Syphard, A. D., J. E. Keeley, A. B. Massada, T. J. Brennan, and V. C. Radeloff. 2012. Housing arrangement and location determine the likelihood of housing loss due to wildfire. PLoS ONE **7**:e33954.

Tihay-Felicelli, V., K. Meerpoel-Pietri, P.-A. Santoni, Y. Perez-Ramirez, A. Graziani, F. Morandini, C. Luciani, W. Mell, and A. Maranghides. 2025. Characterisation of hedge burning in the context of Wildland Urban Interface (WUI) fire prevention. Fire and Materials **early view**.

Uribe, R. 2021. Factors Leading to Structure Loss on the Thomas Fire. M.S. Thesis. California Polytechnic State University, San Luis Obispo.