IBHS RESEARCH



The 2025 LA Conflagrations

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Executive Summary

California's unique climate patterns create conditions that favor wildfires—prolonged drought, dry fuels, high temperatures, and strong wind conditions. While wildfire is a natural part of California's landscape, **expanding human development** increases the likelihood of ignition and raises the chance that fires spread into suburban areas and become conflagrations. **Together**, these factors help explain why California continues to face some of the nation's largest and most destructive wildfires.

While winter months typically see fewer wildfires due to autumn precipitation, higher fuel moisture content, and cooler temperatures, a flash drought began in December 2024. These dry conditions, combined with strong Santa Ana winds, created extremely hazardous wildfire conditions. During the first eight days of January 2025, these conditions resulted in dozens of wildfire ignitions in California. Two of these ignitions in Los Angeles County grew into the Palisades and Eaton Fires which spread into nearby densely built suburban communities and became the second and third most destructive fires in California's history. These fires are the latest in a series to result in uncontrolled structure-to-structure fire spread within communities, or conflagration. The Palisades and Eaton Fires highlight **the persistent vulnerability of the built environment when wildfire ignitions occur in close proximity to densely built suburban communities with receptive fuels, low relative humidity, and wind**—commonly characterized as Red Flag weather conditions.

To understand how these devastating fires spread into and through LA County communities, the Insurance Institute for Business & Home Safety (IBHS) conducted a post-event damage investigation from January 13 to January 19, 2025, with support from partners at CAL FIRE. Parcel and neighborhood factors were captured through detailed parcel-level survey data collecting more than 60 data fields at each location. This IBHS data was coupled with broader CAL FIRE Damage Inspection (DINS) data. Together, these post-event observations provide unique and critical insights into local hazards, the damage pathways in suburban conflagrations, recurring strengths and vulnerabilities in materials and construction practices, and determine patterns of structure ignitions.

Observations from this field investigation aligned with previous post-event investigations showing that the primary factors affecting structures in conflagration are structure separation, connective fuels, and building materials:

- **Structure Separation**: Maintaining adequate separation between buildings remains one of the most critical factors in determining whether a structure can withstand a wildfire. Even for homes with four fire-resistant building characteristics, the chance of escaping damage was under 50% when the nearest neighboring structure was within 10 ft. With fewer fire-resistant characteristics at the same spacing, the probability of no damage dropped to about 30%.

  Although results varied, **each additional 10 ft of separation increased the likelihood of no damage by 7-13%** across different levels of hardening, up to 30 ft. Beyond 30 ft, the effect of additional separation leveled off. At separations greater than 30 ft, the probability of no damage stabilized at about 66% for a structure with four fire-resistant building characteristics and about 51% for a less-mitigated structure with only two.

  These findings underscore the need for a **systems-based approach to wildfire mitigation,** rather than relying on single-component actions.

  Often discussed in suburban conflagrations but rarely systematically quantified is the role of wind direction relative to fuel pathways (i.e., adjacent burning structures). For the first time, this study used the mean wind direction data available from local weather stations to examine the effect of wind direction on the exposure from an adjacent burning structure by structure separation distance. In the Palisades Fire, structures that experienced a downwind exposure were much more likely to be damaged or destroyed, particularly at greater separation distances. At a structure separation dis-

tance of less than 10 ft, the difference in probability of damage or destruction between exposure orientations was only 12% (83% for downwind structures vs. 71% for upwind/crosswind). However, as the structure spacing increased beyond 10 ft, the difference in likely outcomes between downwind and upwind/crosswind structures became even more pronounced, with upwind/crosswind structures being 22% less likely to be damaged or destroyed than downwind structures regardless of building materials or connective fuels.

- **Connective Fuels**: Reducing combustible connective fuels between structures helps limit fire spread and ensures building materials serve as the last line of defense against ignition. IBHS's detailed on-the-ground investigation enabled parcel-level fuel analysis in the first 5 feet surrounding a home—commonly known in California as Zone 0—and in the area 5-30 feet from the home, typically referred to as Zone 1.

  Nearly all structures investigated by IBHS had some combustible fuels in Zone 0. **When Zone 0 and Zone 1 had up to 25% combustible fuel coverage, structures had a 58% chance of being damaged or destroyed.** Given there were effectively no inspected structures with a fully noncombustible Zone 0, the impact cannot be fully assessed. However, it would have likely had an even lower percentage of damage or destroyed structures. When Zone 0 fuel coverage exceeded 25%, the likelihood of damage or destruction increased to 87-100%.

  When Zone 0 fuel coverage was below 25%, the influence of Zone 1 became clear: keeping Zone 1 fuel coverage below 25% reduced the likelihood of damage or destruction by about 24%. By contrast, the risk increased sharply when Zone 1 fuel coverage was greater than 50%.

  These findings underscore the importance of reducing fuels across the entire parcel, in addition to maintaining a noncombustible Zone 0.

  In addition to vegetative fuels, observations commonly showed other materials and household items acted as connective fuels, creating significant vulnerability to structures. Examples included trash bins in Zone 0, combustible decks, hot tubs, and pergolas adjacent to openings or other vulnerable building features. **These everyday items turn to fuel for the fire and increase the likelihood of damage**. Countless times, exploited building vulnerabilities were the primary vector of ignition of the structure. While combustible fences are a well-known connective fuel allowing a fire to spread to the structure, observations in LA County repeatedly found vegetation growing along noncombustible fences, negating the resilient value of the noncombustible material. Post-fire investigations repeatedly show a tragic pattern where wildfires probe each connective fuel, one after another, to find a vulnerability, meaning all pathways must be reduced or mitigated.

- **Building Materials:** Most structures surveyed after the Eaton and Palisades Fires included at least one resilient building component. However, few incorporated a comprehensive resilient system allowing flames, radiant heat, and embers to exploit the remaining vulnerabilities—ultimately leading to damage and loss.

  For example, noncombustible exterior wall cladding and Class A roof coverings were the most common resilient features observed. But these were often paired with vulnerable windows, doors, vents, and eaves, increasing the vulnerability of the structure. When implemented as an integrated system, additional resilient features were observed to meaningfully reduce the likelihood of ignition.

  Even under severe conflagration conditions, **structures with four home-hardening characteristics had a 54% likelihood of experiencing no damage, regardless of separation distance**. In contrast, structures with only one or two hardening characteristics had just a 36% probability of no damage.

One recurring vulnerability across nearly all surveyed structures was the absence of 1/8-inch mesh on vents, which increases the potential for ember intrusion.

These field observations in Los Angeles County reinforce previous post-event investigations: **parcel-level resiliency requires a system** of hardened building components and strategic management of connective fuels to control vegetation density.

This parcel-level approach is **especially important in typical suburban neighborhoods, where maintaining more than 30 ft of separation between structures is often not feasible**. Where structural density cannot be reduced in suburban environments, the building materials and connective fuels—especially those closest to the structure—become even more important.

When resilience efforts focus on the **system as a whole**, the probability of avoiding damage begins to align more closely with the underlying physics of wildfire exposure. Extreme conditions can make it impossible to protect every building; yet a systems-based approach at both the parcel and neighborhood scale can still disrupt fire spread and help prevent ignitions from escalating into community-wide conflagrations.

IBHS's detailed damage investigation data, combined with the broader DINS dataset, quantified higher probabilities of no damage in conflagration conditions when structures had **greater spacing**, **lower fuel density—including vegetation—in Zone 0 and 1**, and **more wildfire-resistant building features**.

Finally, the study emphasizes that coordinated parcel-level actions reduce ignition risk by removing "weak links" that fire can exploit. However, to reduce overall suburban conflagration risk, these measures must be complemented by **community-level actions**—particularly efforts to reduce structural density and connective fuels.



Figure 1. Structure-to-structure fire spread in Altadena, California following the Eaton Fire.