2017–2018 CALIFORNIA WILDFIRES

At A Glance

Executive Summary

Following the Camp Fire of November 2018, scientists from the Insurance Institute for Business & Home Safety (IBHS) and several member companies conducted a post-event investigation to examine the factors that contributed to this destructive fire. Analysis of 2017 wildfires was performed using data collected by CAL FIRE. The full reports on the analysis are available at https://ibhs.org/wildfire/ibhs-post-event-investigation-california-wildfires-of-2017-2018.

The following summarizes the results of the IBHS post-event study:

- Previous testing at the IBHS Research Center has accurately reproduced several of the ignition scenarios observed during the post-event investigation in Paradise, California. The ability to control for specific variables in test scenarios will provide better understanding of which mitigation actions are effective in reducing the vulnerability to wildfire.
- IBHS analysis of post-event data found that building attributes (vegetative clearance, roof and siding material, window type, topography, etc.) are not consistent predictors of survivability.
- Evaluating wildfire risk should include use of improved fuel models and a better way to account for high-wind events, such as those that drove the Camp Fire.
- Structure-to-structure fire spread resulting from closely spaced homes occurred. The structure-to-structure spread behaves like rapid fire spread through continuous vegetative fuels.
- Building damage levels after the Camp Fire were almost always either *undamaged* or *destroyed*. This is consistent with previous significant wildfire events.
- Defensible space was an important characteristic of homes that survived. However, well-maintained defensible space did not guarantee survivability and rapid fire spread with favorable conditions can breach well-maintained defensible space.
- Firefighter intervention was critical in preventing the loss of some structures in Paradise. However, roving protection is not likely in all scenarios and the need for intervention could have been avoided through proper mitigation.

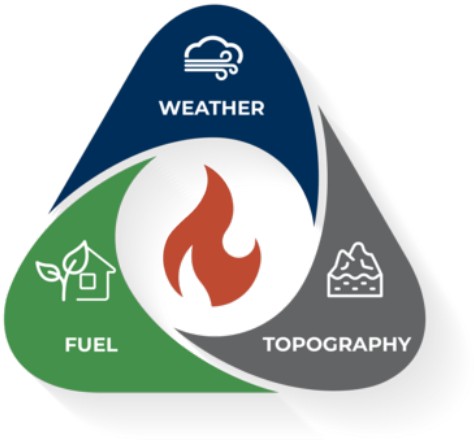
Given the either/or outcomes often seen with structural damage after a fire, there is an even greater need to explore what combinations of factors (building components, terrain, defensible space, etc.) are significant for survivability. This is true in the wildland-urban-interface and in suburban environments where we have seen wildfires produce rapid structure-to-structure fire spread.

Understanding Wildfire

Wildland fires have long been common across much of the United States, occurring in forested areas and the grasslands of the central and southern plains. Factors that influence the ignition and propagation of wildland fires include:

- Readily available combustible vegetation
- Topographical features
- Hot, dry, windy weather conditions

Wildland fire is governed by three components (weather, fuel, and topography) collectively known as the fire behavior triangle. Although there is some knowledge about the influence of these factors on the severity of wildfires, the complex interconnection between them is only partially understood.



The ignition of a building during a wildfire can occur in one of three ways:

- Exposure to wind-blown embers (also known as *firebrands*)
- Direct contact by flames
- Radiant heat

Of these three, exposure to wind-blown embers is considered the most important. Wind-blown embers generated by the burning wildland vegetation or burning buildings or structures, can land on, or near, a home or business and cause direct or indirect ignition of the structure.

Wildfire in California

In California, wildfires have often posed a significant risk to communities, which has become even more acute in recent years. With the population expanding into areas adjacent to wildlands, we are inherently increasing the exposure of communities to wildfires.

Insured losses due to wildfires in 2017 and 2018 were significant, totaling $15 billion and $18 billion, respectively. This is a substantial increase from previous years, with the top five costliest fires occurring in 2017 and 2018.

Table 1: Summary statistics for notable 2017 and 2018 California wildfire events. Shown in parenthesis is the rank on the Top 20 list as of August 8, 2019.

Fire Event	Acres Burned	Structures Destroyed	Loss of Life
Thomas (Dec 2017)	281,893 (2)	1,063 (10)	2
Carr (Jul 2018)	229,651 (7)	1,614 (8)	8 (14)
Woolsey (Nov 2018)	96,946	1,643 (7)	3
Nuns (Oct 2017)	54,382	1,355 (9)	3
Atlas (Oct 2017)	51,624	783 (14)	1
Tubbs (Oct 2017)	36,807	5,363 (2)	22 (4)
Camp (Nov 2018)	15,336	15,804 (1)	86 (1)

In 2017, four major fires occurred. Three of the fires were during October and resulted in over 144,000 acres burned. Of these, the Tubbs Fire is notable for having received a significant amount of media coverage and attention. The Tubbs Fire spread rapidly toward the southwest overnight on October 8, 2017 due to easterly winds from the San Francisco Bay area and northeasterly winds along western slopes of the Sierra Nevada range. These strong winds lofted and transported embers ahead of the flame front that ignited spot fires. When the Tubbs Fire jumped a highway, it ignited numerous homes and businesses in the Coffey Park community of Santa Rosa. Most buildings in Coffey Park were located close together, with separations as small as 9 ft. The fire was officially contained on October 31, and ultimately burned 36,807 acres, destroyed 5,363 structures (second highest of the current Top 20) and led to 22 deaths.

The Camp Fire in November 2018 was California's most deadly and costly wildfire on record. Extremes of weather, fuel, and complex topography came together to create a worst-case scenario. The Camp Fire started on November 8, 2018 and spread rapidly. Driven by an easterly wind, the fire eventually reached the town of Paradise and destroyed most of the town's buildings and infrastructure. By the time it was fully contained, the fire had burned 153,336 acres, destroyed 18,804 structures, and led to 86 deaths.