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How they survived: Owners of the few homes left standing around Paradise, Calif., took critical steps to ward off wildfires



Cathy and Jeff Moore stand in front of their home after the Camp Fire in Chico, Calif. The Moores worked to keep a defensible space around their property before the Camp Fire, clearing out brush around the perimeter. (Mason Trinca/For The Washington Post)

By [Sarah Kaplan](#) and [Frances Stead Sellers](#) November 30, 2018

Jeff and Cathy Moore have devoted hours of labor to clearing brush away from their house in the Sierra Nevada foothills in preparation for a massive wildfire, which suddenly became reality on Nov. 8. Smoke from the approaching Camp Fire blackened the mid-morning sky so completely that they had to light candles indoors.

The Moores started their generator and pumped water from their well to sprinklers on the roof of their California home. After retreating for several hours, the couple returned to spend the entire night dousing vegetation and stomping out spot fires on their own and neighboring properties, preventing them from igniting and further fueling the blaze. By the time the fire department showed up the next day, Jeff Moore said, “everything was out.” Not only was their home saved, but so were adjacent buildings in a neighborhood where many burned.

At least 88 people died in the Camp Fire, many inside homes with flammable roofs and open vents that allowed in smoldering material, turning them into death traps. In the town of Paradise, more than 80 percent of homes

were destroyed. But the Moores' story shows that certain preventative measures can help make a house a refuge when a wildfire engulfs a community.

Some 40 million homes across the United States risk being destroyed in wildfires, according to the U.S. Forest Service. Many were built according to outdated fire codes, with an eye for aesthetics but not always for safety. Even in California, which has the country's most extensive fire risk maps and relatively advanced fire codes, scores of communities are threatened by uncontrollable burns.

The state updated its fire code in 2008, mandating that newly built homes near wildland areas meet standards for fireproof roofs, windows and decks, and follow rules for creating "defensible space" clear of flammable material in the 100 feet immediately surrounding a home.

But that leaves the vast majority of California homes, regulated by outdated standards, vulnerable. Jack Cohen, a former firefighter and longtime fire behavior expert for the Forest Service, says maintenance of a house and the area immediately around it can be as important in protecting it from wildfires as its construction.

Many fire-prevention measures can be cheaply addressed by homeowners: Clear pine needles and other flammable debris from roofs, rain gutters, decks and yards. Avoid stacking firewood directly against a house. Border the home with bare-soil flower gardens, rather than bark mulch. Replace wooden fences with materials that don't burn. Install mesh screens over vents to prevent smoldering material from getting inside. Surround homes with fire-resistant hardwood trees, like aspen, oaks and maples, which can form a heat shield and wind damper during a conflagration.

"It's the little things that are igniting our communities," Cohen said.



An apartment complex remains standing amid the debris of the surrounding structures after the Camp Fire in Paradise, Calif. (Mason Trinca/For The Washington Post)

After raging for two weeks and scorching 153,000 acres of Butte County — an area larger than Chicago — the Camp Fire was contained this week. The blaze became a structure fire that spread rapidly, with burning debris carried by 50 mph winds from home to home, said Cal Fire information officer Scott McLean.

Luck seemed to play a role in some buildings' survival, he said.

“That firestorm was different,” said McLean, who helped people evacuate, “throwing so many embers out ahead that could land anywhere, among debris in a gutter, on a chair, on a deck.”

Cohen, who has spent most of his career studying ways to make wildfires less deadly and destructive, pointed to aerial photos of Paradise neighborhoods where every house was leveled, but the surrounding trees were green and relatively unscathed.

“It’s the community that is actually spreading the fire,” he said.

But it doesn’t have to be that way.

“The wildfire is a given,” he said, noting that the North American landscape has evolved to require fire over the past 10,000 years. “But . . . we can make choices that make us resilient to these disturbances.”

Each house that resists burning is not only a home preserved — it is one less source of fuel.

Homes that are truly ignition-resistant may also offer shelter in situations when evacuation is not an option, Cohen said.

Almost everywhere in America, including Paradise, the only safe thing to do in a fire is to flee. But if communities are built for fire resistance, with nonflammable structures and well-established emergency response plans, in the future it might be possible for residents to shelter in place during a fast-moving firestorm.

The updates to California’s fire code focus on protecting communities like Paradise that border natural areas — the fastest-growing kind of community in America. About a third of U.S. homes are built in what’s known as the “wildland-urban interface,” said Kelly Pohl, a researcher at the nonprofit Headwaters Economics, who studies fire ecology and community planning.

Officials also developed a statewide fire-risk map that reflects how topography can put people at greater risk; in Paradise, for example, canyons acted as chimneys, funneling fire toward homes on upper slopes.

The new regulations codify the understanding that limiting home ignitability is the most important factor in preventing a humanitarian disaster.

Meeting these standards doesn’t have to be costly. A [report](#) by Pohl released in November found that construction costs for a model “fire wise” single-family home with a nonflammable asphalt roof and fire-resistant tempered-glass windows were \$2,000 less than for a typical house.



Newly developed homes remain relatively damage-free on Boaz Lane after the Camp Fire in Paradise, Calif. (Mason Trinca/For The Washington Post)

A brand-new house on Paradise's Boaz Lane that Bonnie Campbell moved into four weeks before the fire featured a composite roof and thick stucco walls, materials recommended by California's fire code. Bulldozers had also inadvertently created a fire break, Campbell said.

Campbell hasn't seen it since she and her husband fled on the morning of Nov. 8, driven out by flames that swept up the canyon and engulfed a house just a few hundred feet from her own. But official [maps](#) of their neighborhood show that her home still stands, though a redwood fence is damaged.

Around the home is devastation. A neighboring street, Schmale Lane, with older buildings, is scorched to cinders.

This disparity underscores a problem that lingers even in communities with progressive fire codes: Most houses in the wildland-urban interface predate these standards, and retrofitting existing structures is often beyond the means of most homeowners.

And there aren't many resources available to help them, Pohl said.

Though the United States spends upwards of \$2 billion each year on fire suppression and billions more helping communities recover, the current budget for the Federal Emergency Management Agency's Pre-Disaster Mitigation Grant Program is just over \$200 million — and it must address hurricanes, earthquakes and a host of other natural hazards as well as fires. Cal Fire provides grants for forest management and tree removal, but not structure modification.

The budget for the University of California Cooperative Extension program, which conducts fire research and outreach to homeowners, has been cut by almost half since 2000. There are now fewer than 20 extension advisers in forestry and fire serving a state with 40 million people and 15 million acres of public lands.

In light of the recent National Climate Assessment, which [predicts](#) a massive increase in the frequency and severity of wildfire, Pohl said that funding preventive measures is a life-or-death question.

“The reality is we know how to do better,” she said. “But we are too slow to change.”

Jeff Moore is determined to make further improvements to his house, which was built according to code in 2015.

“We learned a lot,” said Moore, who studied how the recent fire behaved — appearing to die down before roaring back up a dry creek bed. After the fire, Moore went into his attic to fetch coolers for his neighbors who remained without power and found that his rooftop vents had taken in ashes despite protective netting.

“We’ve got to fix that and get finer mesh,” Moore said. He also plans to get more fire extinguishers.

“We’ll keep at it,” Moore said. “I think we could survive it if it happened again.”