Saving Your Home in a Wildfire

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My Golden Rule for My Own Home to Survive a Wildfire (and it did after being overrun)

1. **Don't evacuate.** Never leave your house unattended/never evacuate. Evaluate your location and neighborhood. Know your area as your own safety may depend on your neighbor's preparation.
2. **Be proactive and prepare defensible space**. This not only pertains to removing flammable landscape and wildland fuels but also includes wood fences and other flammable items close to the house. Conduction, convection and radiation heat sources may impact your house directly. The millions of firebrands will also find and ignite anything flammable.
3. **Secure a water supply**. Locate trash cans around the house. Fill them with water, place rags or gunnysacks in at least one trash can and put a stone on the lids. Fill up the bathtubs. If your neighbor has a pool or uphill water tank, work together in protecting your immediate neighborhood. Don't just rely on the fire hydrant in front of your house or at the street corner.
4. **Protect the windows, vents and weep screeds.** Eliminate flammable trees and shrubs near windows and wood fences close to the house (at least five feet distance).
5. **Don't live in a house with a wooden roof** or in a wood roof community.

To my knowledge we have never lost a home in a wildland fire if these golden rules were followed. K.R.

Now let us look more closely at these Golden Rules and evaluate them as documented by eyewitness testimony of homeowners that did not evacuate during fires such as the November 2, 1993 Old Topanga Fire in the Santa Monica Mountains. The fire burned again through a chaparral ecosystem dissected by narrow, slide-triggering roads, interspersed with Pine and Bluegum eucalyptus trees and at times homes bunched too close together with wooden fences along with highly flammable railroad ties as erosion control measures. Many of the lessons learned/relearned and documented by eyewitnesses is also applicable to other wildfire ecosystems. So, let us take time to read, evaluate, learn from each other, work together and be prepared.

1. Don't Evacuate (a Firefighter's Golden Rule); Shelter in Place. Protect the windows and vents.

During the hundreds and hundreds of home inspections I conducted, I always stated "This is what I would do if this would be my property." If these recommendations would be carried out properly, there rarely would have been a reason to evacuate. Remember that most fatalities in wildfires are caused by people caught "in the open." So, don't panic and don't become a statistic. Evaluate your situation and be prepared to stay or evacuate if you must. Again, don't be caught in the open.

Fire winds blow out windows of fire catcher homes (the house blows up). Fire catcher homes are often two story or larger homes found in areas most susceptible to wildland fires such as ridgetops, top of slopes, sideslope or within or on tops of draws. These are not homes to "Shelter in Place." However, many of these can be made much more fire-safe.

Eyewitness Testimony:

*The CDF crew decided to retreat into the unburned house adjacent to the burning garage. The wood fences along the driveway were on fire along with the hedge. The crew foreman said that they were now in the middle of the firestorm and that they had to find some clean air to breathe inside the house and that the firestorm would go over in about fifteen minutes. It would take at least 1 to 1.5 hours for the house to burn down and that they would exit after the fire storm had passed. It was now pitch dark and it felt as if Gil was in his own world. So much smoke was in the house that the alarm was going full blast. The living room and upstairs were full of smoke (unfortunately the upstairs windows had been left open and they had no screens). So the foreman took everyone down to the third and lowest level of the house below the driveway where there was good air to breathe and wait out the firestorm.

*Kurt and brother Brad were instrumental in saving a total of seven homes, including Kurt's own. They had a fire hose hooked to the fire hydrant in front of Kurt's house. According to Kurt's observations, at least 16-18 homes out

[1] **For further information and concepts on fire and watershed management please refer to the 1982 through 2004 publications *"A Homeowner's Guide to Fire and Watershed Management at the Chaparral-Urban Interface"* still available for free downloading from the Web and also from the Web site firesafetyus.com.**

of approximately 48 did not burn until hours after the firefront had passed. Good water pressure was available in the hydrants within an hour at most after the firefront had passed, so these houses could have easily been saved. Firefighters were not willing to come up Rambla Vista as they considered it too dangerous.

*"I ignored Sheriff's Department orders and walked along the beach from Topanga to Big Rock, arriving at my house at about 3:30 p.m. It was my intention to stay and try to save our house. I feel reasonably secure in my understanding of fighting fires due to my training as a Naval Officer. I was involved in preparing my proper clothing and firefighting equipment, constantly avoiding the helicopters and law enforcement officers at the door. At 6:30 p.m. an out-of-town fire company was parked in our driveway. The telephone which was still working summoned me at about 6:45; my wife and children asked me to leave because the media was repeating the command structure's demand for homeowners to evacuate. They were afraid for me. With a fire company on my driveway, I felt reasonably secure in turning over the job to them. I showed the fire company the pool and I opened the gate for them." As witnessed by a neighbor who did not evacuate, the fire engine left soon thereafter and the house caught on fire late at night and burned down unattended.

*The owner had saved his house with his fire pump and had to stand watch all night to be sure another flare-up did not occur. During this time period two other houses in the area burned. Since there was plenty of water in the area (over 10,000 gallons) these house could have been saved if firetrucks were there. If there were really 7000 firefighters in the Malibu-Topanga area it is incomprehensible that at least one truck and crew could not be assigned to this area for the duration of the threat (Note: the site in question was near Fire Camp 8 which was "in chaos" as reported and was crowded with hungry, tired and sleeping fire personnel).

*With the chimney damper closed, the car turned around in the garage for quick evacuation if necessary and no flammable materials anywhere around the house, she was waiting for the fire to arrive. The long and step slope had an excellent 200-foot fuelbreak except for sections of the adjacent slopes where a developer had not cleared the almost 50-year old chaparral despite continuous Fire Department notices. However, they had also done some clearance there beyond the fence. Then the buffeting winds ahead of the firestorm suddenly started to shake and bend the large tempered glass sliding doors facing the slope back and forth with ash entering through the cracks. As the firefront was racing down the opposite canyon through 40-year old chaparral, she evacuated, fearing that the glass plates would blow out of the frames and thought that the house was lost after she left. As witnessed by a neighbor who was safely situated across the 32-wide street, the uphill moving flames totally engulfed the one-story wood siding home with a composition roof but no decks for just a short time before they died down and the house reappeared. Because the slopes had been meticulously cleared of any flammable fine fuels, there was virtually no flammable fuel remaining that could carry the fire further and extend the burnout period. Apparently, none of the windows blew out after all but it was a close call. Black char marks were left on the wood siding facing the slopes and the raingutters were thereafter leaking at the seams.

A reminder: Fire winds blow out windows of fire catcher homes (the house blows up). Fire catcher homes are largely found in areas most susceptible to wildland fires such as ridgetops, top of slopes, sideslope or within or on tops of draws. These are not homes to "Shelter in Place" but can be made more firesafe.

If the fire winds don't blow out the windows, direct flame impingement from downslope flammable fuel sources and largely all around the house landscape fuel sources, especially close to windows, will then follow up to finish the job. The windows of newer homes are now protected with double-pane windows and often tempered glass on large sliding doors. However, the last and best defense for even such windows is fire shutters.

What do hurricanes and firestorms have in common? Both are powerful storms that knock out windows. If the storm fronts don't manage to do it, the many flying objects inclusive of broken tree branches (and even large pine cones) can accomplish this. While all around the world people therefore secure their windows with storm shutters or plywood in preparation of a hurricane, in fire-prone environments people often just vacate like lemmings (or are forced to do so), then watch from nearby roads or on TV in horror or disbelief as their homes turn to ashes.
As already "demonstrated by field research" during the November 2, 1993 Old Topanga Fire, homes that were either protected by the more expensive Roll-away aluminum storm shutters (Cashin - Hume Road) or, along with vent openings, by inexpensive, largely homemade plywood shutters (Hill - Las Flores Heights Road) readily survived in the middle of a firestorm while most surrounding homes burned. For a home to survive a wildlife, it is therefore extremely important to combine fuel modification with protecting the windows. Protecting windows is even more important than protecting vents in largely stucco homes because windows will blow out before firebrands will enter through the vents and perhaps start igniting the interior wood frame. When protected by ¼"wire mesh as required by building and fire code, the home will rarely ignite by firebrands or burning ambers but can more readily ignite from any flammable materials placed next to those vents such as landscape plants, leaves, birds nest, wooden fences, materials "pack-rated nearby" or even a wooden doghouse as documented. Amber-resistant vents are often recommended to retrofit attic, soffit, basement, foundation, and gables.

However, before doing so, consult with a building contractor, architect, or engineer to ensure that adequate ventilation exists when installing ember resistant vents which may restrict airflow. Also, be aware of pet entrance doors. They are best placed near largely nonflammable floors and interiors such as the kitchen and bathroom.

Can a wooden home with a nonflammable roof whose windows and other openings are protected, survive if overrun by a firefront? Of course, as documented by the many charred sides of wooden homes provided the burnout period of the surrounding fuels is greatly shortened.

On the other hand stuccoed homes have Achilles heels that are seldom acknowledged or recognized even by experienced fire personnel evaluation fire losses. These are the "weep screeds" at the base of a stucco house. Homeowners are not aware of them and largely plant ornamental vegetation around the house that, even if watered, collect flammable debris such a leaf litter.

Eyewitness testimony

*Malibu: Using backroad trails, he got around the police lines on his bike. As he approached his new, fire-safe, all stucco house with all-around good clearance, he saw smoke coming from the chimney. He ran into the house which was full of smoke and realized that fire had gotten into the wood frame from the weep screeds located on the outside along the ground. The interior not being completely finished, he was able to expose the affected interior wood frame areas and extinguish the fire.

*Malibu: Seeing the smoke, he realized that the fire had gotten into the wood frame of the one-story stucco home, perhaps from a wood post nailed to the frame near the front door before the house was stuccoed. He immediately grabbed a hammer, felt the stucco with his other hand and started knocking holes into the wall where he felt the heat. Then he took the garden hose and concentrated the water into the holes, extinguishing the smoldering wood frame fire. The horses in the large corral were on their own, moved around, and survived unhurt as the fire front swept through the area.

*The old stone house with its wooden window frames and some of the surrounding flammable vegetation was foamed down by the firetruck just before the firestorm approached, which blew out the many unprotected windows and burned down the house.

*"Suddenly a fireball (it felt like a flamethrower) flew over, incinerating a home directly in its path (windows blew out.) The lower envelope of the fireball also left a black scorch mark on the wood siding along the upper east wall of my house but it did not burn."

*Matt had a newer house with double-pane windows, stucco siding, no flammable landscaping, and a large lawn taking up the downhill area of the property. However, there was a row of large eucalyptus trees on his neighbor's property within 10 feet or less of his house which the neighbor did not want to cut down, probably because of privacy, also claiming that they were a Monarch butterfly habitat. As the neighbor's house and the row of eucalyptus burned along the east side of his house, all outer-pane windows of Matt's house broke as they were exposed to the radiation heat. Two of the top floor windows also fell out and broke in many pieces. Even the stucco surface (the stucco was smooth-finished) peeled off in places. The small 2x4 wood retaining wall burned adjacent to a vent touching the rear, and Matt thinks that he was lucky that the fire did not enter the house through the vents.

*The second floor window at the side of the house facing the long and steep downhill slopes broke but the flames could not enter the house because he had placed a prefabricated plywood shutter against the window from the inside prior to the firestorm approaching.

*"He (the policeman) told me he would arrest me if I tried to go in.," remembered Mayer with obvious bitterness. "I only regret I didn't get his badge number." Mayer stood there, infuriated, watching the windows of his house first break in the fire, then he heard the burglar alarm go off. About 5 p.m. the fire overtook the wood-frame structure, burning it to its foundation and gutting a cement-block garage and office complex below. He could have saved it himself (Laurel Canyon Fire, L.A. City 9-16-1979).

*Stucco homes with Class A fire-safe roofing along with wood roof homes located at the top of a 50% slope not properly cleared yet as per fire department requirements were quickly ignited when they were engulfed by flames and their windows largely blew out (Baldwin Hills Fire, L.A. City 7-2-1985).

2. Provide Your Own Water Source

No water systems in fire-prone mountainous areas are designed to provide water from hydrants (or even garden hoses) as the firefront overruns a community. It is therefore critical that the homeowner provides his own water source.

The least expensive water source are sturdy plastic trash cans filled with water strategically placed around the house (as well as gunnysacks and perhaps a shovel). Of course, if a pool or a gravity-fed water tank is available, you can be your own firefighter with some basic training and also assist your neighbors in saving their homes.

Remember again, if caught in a wildland fire, the safest place is still your home. So, be prepared and provide yourself with defensible space. Most fatalities occur with people caught in the open and overcome by the heat of the fire before the flames even reach them. When caught in the open, most fatalities occur in light fuels such as grasslands because the wind can quickly and unpredictably change direction. One cannot outrun the radiating heat sources from even such a seemingly "non-threatening" fire.

Eyewitness testimony:

*"Any amount of water in a tank with a pump or even barrels of water under rain gutters with buckets can be a deal breaker. A few 50 gallon barrels full of water saved Jim Kiewit's house when we found them.

*After the firestorm had passed, he exited his basement, kicked on the generator, positioned his 2" fire hose and started pumping from the pool."

*The wooden trellis attached to the front of the unattended house had caught on fire and was burning towards the front door and window when the downhill neighbor ran over, knocked down the trellis and doused it with his five- gallon bottles of water, saving the house.

*"I grabbed two fire extinguishers and ran to the house below where a bush adjacent to a window on the uphill side of the slope was fully engulfed in flames and was igniting an adjacent pine tree. I was concerned that if any of the houses below would catch on fire, they could then ignite a neighboring house and of course my house. I saved both houses."

*"The adjacent home had a pool. I had a water pump and used the pool water. When some of the landscape vegetation ignited around my house, my neighbors and I put out the fire."

*"As my house burned I was able to stay alive at my neighbor's home who pumped his pool and was able to save his home."

*The men started the gasoline fire pump to draw water from the pool and started hosing down the structures. All outdoor furniture, etc., as well as firefighting tools, were placed in the garage. As time permitted, all vines were torn from the buildings and trees were cut down.

*The morning of the fire the gardener came as part of his normal route, saw the smoke from the fire, and turned on the automatic landscape watering system (cycles on all stations) and probably also the roof sprinkler. While the wood deck burned and fell against the stucco house, the unattended house did not burn.

*In the evening they tried to find out where fires were still coming from in the neighborhood and found that all of the propane tanks were still turned on (these were normally 500-1,000-gallon tanks). For example, someone had a swimming pool and the water heater was engulfed in 10-foot flames. Bryan found the propane tank and turned the gas off. They did this with about 6-8 tanks. If attended, many of these houses would have been simple to save, as they had big swimming pools and hot tubs.

*One type-3 engine from CDF with four firefighters (three men, one female) tied into the unattended house as it had a large pool as well as a pool pump and saved it.

*Three firetrucks with tired firemen from three surrounding cities moved up to his long, protected driveway to get away from the firefront as they had no water. He offered them pool water from his large pool which was the only water source in the area and also offered them water to save nearby homes. When the studio (round building) caught fire about six times during the night along the north end, firefighters helped him put out the fire with his pool water. The fire had penetrated the one-foot-wide wooden fascia board at the end of the roof along the backside of the house where the slope almost meets the building. From there the fire went into the interior crawl space where the electrical wires were located. The railroad ties also were a problem and burned for days after the fire.

*Homeowner firefighters arrived back about 30 minutes after they had to retreat and the houses were still standing. They used the rags in the trash cans to put out spot fires.

*Dick ran across the hill down Rambla Vista to get the Fire Department, but they would not come uphill. They would not even use the pool. So he ran back up and kicked over the wooden fences, which initially saved the house. Electricity and water were out. It got so hot that first the paint on the wooden garage door of the neighboring house would bubble up, then the garage door would smoke, then it would ignite. He stayed throughout the fire storm, even going into the pool.

*Bill helped the firemen hook up the pool pump. After they left, Bill kept an eye on the house all night as the trees and spot fires around it kept burning. (It had a wooden deck and was very vulnerable to spot fires.)

*The day-laborers used buckets and water from the fish pond to put out spot fires.

*He was bitter that his unattended home had burned down with his dog inside as there was a fire hydrant located along the street in front of his home (He did not know that firefighters had tried to tie into the hydrant but found it "dry.").

3. Provide Defensible Space inclusive of Safe Access. Stay Calm.

A fast-moving firefront is largely fed by fine dead fuels under 1/2" in diameter that can quickly lose their fuel moisture as drying Santa Ana, Foehn or fire winds materialize. As a firefront then flashes through an area, it burns all remaining vegetation that has been preheated to the ignition point. In chaparral ecosystems, consisting largely of small diameter fuels, such burnout period may only last 10 to 15 minutes, and in coastal sage scrub even less. In forested ecosystems or when houses burn down, such burnout periods are often much longer.

Eyewitness testimony:

*The fire department had already warned us previously that our private roads were too narrow for their trucks.

*There were newscasters like ants out of an ant hill. They never did anything to help but were just in the way doing their news. Interviewing her, they wanted her to cry to enhance their news story but she refused. On the other hand, she loved everyone that could help her such as fire people, animal control officers, road crews.

*The cars parked along the narrow road were momentarily engulfed by fire. Darlene watched the paint peel off the newscaster truck and the newscasters looked real nervous. She was never afraid because the firemen were there too, telling her everything was OK. A tree (limb?) fell and first hit the newscaster car before bouncing off the top of her car. The firemen got briefly out of their truck and hosed both cars down. When there was an opening in the flames, the cars moved instinctively forward by a few feet or so. When the flames closed in, they stopped. The cars that were flanked by the fire moved more often. At about 1705 the firemen in the fire truck said that they could leave to Fire Camp 8.

*Suddenly he saw the Blue Gum eucalyptus behind his house catch on fire and rushed over there. Then the tires of the two-wheel utility trailer parked near the eucalyptus trees caught on fire. Now the fire came down the hill from the north. Suddenly, surrounding eucalyptus trees were also on fire.

*2-story wood house at edge of slope without setback with wooden decks facing down-slope and pool. A stone wall adjacent to the street as well as a driveway and parking area between the wall and the house provided added separation from fire exposure of burning uphill vegetation on the slopes. Only a few trees around the house. Lush vegetation. Firetrucks had made a stand at surrounding houses and probably saved the house as there were scorch marks from firebrands on the deck.

*The palm tree behind his house was on fire. He found shelter behind his own 4-foot-tall stone wall and sat out the firefront. The actual heat wave and the total engulfment of the flames was over in about two minutes. The neighbor's automobile was on fire. The leaves in the gutter of the neighbor's house were on fire. Hot spots were everywhere. Some of his trash buckets had water and he used it to douse hot spots on his deck.

*Much of the area to the south and east is fairly level and is disked every year, providing a good fire-break

*8 to10 day-laborers from the labor exchange came to upper Via Costera and effectively fought the fire with chain saws and hoses and helped save the homes. Earlier a young sheriff with a bullhorn had ordered everyone to leave but they ignored him.

How much shall I clean?

This depends on your particular situation. When I documented in my 1982 *Homeowner's Guide to Fire and Watershed Management*... that an uphill moving fire on steep slopes could already produce flames in excess of 30 feet in two-foot-tall low-fuel plants such as coyote brush (Baccharis pilularis) and that the flame length could exceed 100 feet in six-foot-tall chaparral, some fire departments recommended/required fuel modification of up to 200 feet. When an unprotected house is located sideslope or in draws or "fire chimneys," meaningful recommended fuel modification may even exceed these distances, especially if a house is unattended. However, remember, whatever you do, first start clearing all flammable fuels from around your house.

Additionally, remember the following and realize that your home can readily burn down from conduction, radiation and convection heat sources even on level ground. Radiation heat is the transfer of heat by electromagnetic waves and can, therefore, travel against the wind. For example, it can preheat the opposite side of a burning slope in a steep canyon or a neighboring home to the ignition point. Again, it can be predictably managed if you are in control of your situation as the following landscape examples illustrate. For a point source of radiation, the heat intensity decreases with the square of the distance. This means that a burning tree 40 feet from a roof or picture window transfers only one-fourth of the heat to the house compared with a tree burning within 20 feet, and one-sixteenth the heat compared with a tree burning within 10 feet.

A line source of radiation such as a burning hedge of junipers or cypresses is even more critical than a single point source because the house receives a broad expanse of heat from all points along the line. In this case, heat intensity varies with the distance instead of the square of the distance, so that the heat intensity at a

home located within 40 feet of the burning hedge is still one-half that at 20 feet. This is a powerful incentive not to plant potentially flammable hedges or hedge-like "groundcovers" near structures, as well as keeping flammable shrubs and trees as far away from your home and especially windows.

Eyewitness testimony:

* "I turned up to the left and watched Rick's house on fire. It was a big brand new cliffside house and generated an extravaganza of flame. Below was a near 45 degree or steeper slope, maybe 500-600 feet to the highway. Flames bellowed out of the shattered windows in a weirdly high-pitched screech."

*"Suddenly all my tall pines burst into flame on the front of my hillside. The fire had just sprung upon us. It could never have had time to burn down into the deep canyon separating us from the opposite ridge. The fire must have jumped across the canyon somehow. Burned right through the air to us. In the instant before I leapt off the roof, the flames had to be well over 100 feet high. It was like an explosion. As I ran off the edge of the roof, I kept repeating to myself, "Don't break your leg… Don't break your leg!" I landed on the upslope of the hillside with my hose, and rolled down behind the garage to avoid the blast of heat. I lay there with the hose in an inexplicable cacophony of crackling or something that sounded like swarms of insects, I don't know how to explain it, but suddenly I knew the firestorm had roared over me."

*"I got to my feet and rushed out with my hose. Fire raged everywhere around my home. I dragged my hose from the front to the back of my house and back again, putting out flames in plant material and on the wood siding. I loped down the arbor path, dragging my hose over our concrete pavers toward bursts of light. The Juniper bushes at the corner of our bedroom exploded in grey smoke at the end of my stream. Then an explosive crackling spun me around as our Podocarpus trees blazed around our garden deck. Below them in darkness were our avocado and citrus trees, which were finally giving fruit after years of care. I blasted the deck and burning Podocarpus trees as the tall smoky skeletons of our hillside pines sputtered in sparks overhead and dropped flaming limbs."

*"Along my driveway all my Italian Cypresses spewed up flames in crackling bursts like huge roman candles."

*"Suddenly, down at the last house at the end of our street, a large eucalyptus tree burst into white flame. Somehow the house and tree had out-survived all the others on our street."

*He was a safety minded Vietnam vet and did excellent fire clearance around his mobile home which was one of the few homes that did not burn.

*The heavy brush on the steep slopes below the house was instrumental in starting to ignite it.

*As the fireball passed, it had gotten so hot that all plants on the east side of the house scorched. Most of the leaves were burned off the Blue Gum eucalyptus trees along the slope near the southeast side of the house and the trees were on fire.

*The house had a large pool as well as a pool pump but was surrounded by many trees. Owners evacuated quickly. CDF tried to save it but could not. Too dangerous, too many trees.

*Another house with a wooden deck (at the bottom of a narrow driveway with little brush clearance) overlooking a steep draw about three hundred feet long (chimney effect) ignited quickly.

*As witnessed, a fireball engulfed the house. It must have gotten very hot before the fireball died down quickly because of lack of fuel directly around the house. The seams of the copper rain gutters still show heat discoloration after the fire. A winter woodpile burned which had been placed against the concrete wall near the house. There were no railroad ties near the house.

*The house had no trees around, good clearance, and survived.

*The flames first came from the west (uphill behind his house). They went thirty feet past the hillside but did not reach the house, as they were cut off by the vegetation clearance he had done.

*The 3.5 acres of bare land south of his house had not been cleared prior to the fire. The owner told him that he was legal because he did not have to clear the brush prior to the fire because the Fire Department had given him an extension.

*2-story split level all-exterior wood house with tile roof sideslope along steep slopes with a long, narrow, private driveway leading uphill to the house. Two helicopter drops were made on the house but it could not be saved. The big trellis on the downhill side covered with Bougainvillea ignited with a big bang. Then the house ignited (window blew out?). Many pine and eucalyptus trees below the house and along the sides also started to burn.

*One-story stucco house with tile roof overlooking steep, westerly-facing slopes. Fire-stopped tile roof. They had done excellent weed abatement in excess of 100 feet down the slope about three weeks before the fire which impressed the firemen. Dana had closed all the windows but forgot to fill up trash cans with water. He followed instructions by firemen such as turning on the hydrant at Rambla Pacifico, etc. Two helicopter drops were made on the backside of his house and the house next door. Firemen laid on the ground for cover when the drops were made. House did not burn.

*Large, two-story stucco house with tile roof and extensive down-slope groundcover greenbelt which is regularly watered. Owner did not evacuate and protected the home.

4. What Can or Shall I do if I Own a Lot with Limited Defensible Space?

Remember, while you only have to prepare defensible space up to your property line by removing flammable fuels (wildland, landscape and structural) for about 100-200 feet as per fire code, depending on your situation, your safety also depends on your neighbor's willingness to cooperate. But many homes are lost in situations where there is no such defensible space all around the house because the lots are small and the neighbor's trees, wooden fences, etc., are in close proximity to your house. That is part of the reason why there is so much disconnect and so much frustration with the well-meaning pamphlets prepared by fire agencies on how to prepare defensible space.

This is what you can do immediately to not become a SITTING DUCK. Cut back the neighbor's flammable vegetation encroaching onto your property up to the property line and document it. Tell your neighbors to maintain their vegetation fire-safe. Protect your exposed windows with either fire-safe, remote-controlled roll-down electric or hand-crank shutters or even wooden shutters that you can often fabricate on your own, and also protect your vents.

If at all possible, replace the wooden fences around the home and along a close property boundary with your neighbor with a heat-shielding stone wall. It will not only protect your home from radiation heat sources but may also be your "life-saver" if you choose to remain behind or are caught in a firestorm. It is also critical for firefighters' safety.

If you neighbor has not followed through yet on your request to fire-proof flammable vegetation, and pine trees are still loaded with dead needles during the fire season, hose the trees down to remove the dead pine needles. If the flammable trees are drought-stressed, you may want to lay a hose under them in the interim so that they are deep-watered.

If time permits, become a community organizer and help create a more fire-safe neighborhood.

5. What about Wooden Roofs?

No wooden roof is safe in wildland fire situations. Largely ignited by firebrands, they then create self-feeding fires that can burn hundreds, even thousands of nearby homes. Change your wooden roof or make sure that you are not located in a wood-roof community.

Wooden roofs are not addressed here as the reality is that within a short period of time, the remaining wood roof homes still existing in wildland areas will have burned during wildland fires if not changed to fire-resistant roofing, and that the local communities will then (finally, finally!) overcome the lobbying of the wood shingle industry and pass truly fire-resistant roofing ordinances when rebuilding.

Pre-1990s homes (largely dried-out wooden houses or houses with wood decks whose windows are largely only protected by single pane or non-tempered glass windows) are also at high risk.

Most past "Shelter in Place" fatalities occurred in wood roof homes. A wind-driven fire spreads so quickly from wood roof to wood roof and turns then quickly into a firestorm that escape is not possible or unprotected windows blew out in fire-exposed, largely fire-catcher, older homes. Also, many of the serious burns occurred when people were caught in the open or were running away from the sudden "fire inferno" caused by wood roof homes burning as was already well documented during the Sept. 16, 1985 Baldwin Hills Fire in Los Angeles City.

<u>Eyewitness testimony</u>

*Many older homes in the neighborhood had wood shingle roofs when Big Rock was developed and he had changed his wood roof to asphalt shingles after purchasing it some time ago. It did not burn but the fire burned most of the other wood shingle roofs on his street still remaining there.

*"I ran into the backyard and saw smoke rising like steam from their cedar shingled roof. I found a ladder and climbed up. Mark's son rushed around the corner to help. He found a small plastic child's beach bucket lying next to their Jacuzzi, and handed up pitifully small amounts of water with it. When my eyes adjusted to the dark on the roof, I realized the smoky shingles under my feet were dangerously full of charred black holes venting smoke. The fire was in the attic. I hurried off the roof and climbed down. The house could not be saved."

*Below his house, the neighbor's house had a wood shingle roof overhang. Gerhard and friends took a ladder and ripped the wood shingles off as the wood roof section caught on fire and saved it.

*"I grabbed my 1" hose hooked up to my mains pressure, and climbed a ladder to my garage roof. In a few moments my roof was literally covered in petals of flame dropping from the sky. Looking upwards they fell as if from inside of a volcano. It was remarkable how well a rock roof held up to such a thick carpet of glowing embers over it. I wielded the hose stream

over the glowing roof, blackening large wedges, but there was so much fire falling from the sky that my hose made little difference."

*"With wet cloths tied over our faces because of the smoke and because of lack of water, we used a shovel and dry gunny sacks to beat out the firebrands that were blowing down from the burning uphill house some distance away and landing on our neighbor's wooden roof. The neighbor had evacuated without filling up any trash cans or the bathtub with water. The owner of the house told us later that his insurance company paid for a new roof as he told them that firefighters had damaged the roof, trying to save the house."

*County Supervisor Kenneth Hahn, along with Los Angeles City Fire Commissioner Anne Lane and firefighters, said many of the homes might have been spared if they had not had wood-shingle roofs. The evidence was visible throughout the fire area. Homes with rock roofs stood virtually untouched by the fire while homes on both sides, across the street and in back were burned to the ground. However, the fire was so intense that it exploded windows and consumed some homes with rock roofs (Baldwin Hills Fire L.A. City 9-16-1985).

6. What about Wood Decks?

Many fire losses of unattended homes <u>after</u> the firefront has moved through are caused by wood decks or flammable fuels (rats' nests) accumulated around the house igniting.

<u>Eyewitness testimony:</u>

*One unattended house burned near my house after the firefront had moved through because burning embers had fallen on the wooden deck. It could have been saved with a garden hose.

*"I saw flames on the wood struts of the wood deck which burned for hours and the car on the wood deck caught fire and rolled down the hill. The house itself finally caught on fire and burned full blast about 0200-0230 at night (firefront went by about 1630 or 10 hours before)."

*The house was the easiest to save if the owner had been home and should not have burned. It was all stucco and had practically no flammable siding. Its wood fence and outdoor furniture did not burn. However, it had two small wood balconies and one of them caught fire. If the owner would have been home, he could have stomped out or pissed out the fire. For 10-15 minutes the balcony burned before it started igniting the house. Then it took a couple of hours for the fire to eat through the house.

*Fire trucks at Hellstein's house filled up with water from the pool and were send over and extinguished the fire on the wooden deck and protected the house from burning.

*The house had a pool. As observed by the neighbor, the wooden deck of the overall fire-safe house caught on fire and firemen from the fire truck tried to cut it off with a chainsaw but were not successful. The house subsequently burned.

*Two-story wood house with wood deck, many trees around house. The deck burned, windows broke and firebrands ignited the interior. When the owner returned, he helped save the house by extinguishing the firebrands in the interior while his neighbor aimed water at the house from his water tank. Prior to the firefront hitting the area, both had already cut down the big pine tree between both houses.

*When he returned to the house after his attempt to evacuate (escape route was closed by tall Bluegum eucalyptus trees burning), all decks had caught on fire. Fortunately, they were made of thick 3" wood and burned slowly. A staircase made of 2" wood had already burned down. Firebrands had caught near the wooden deck door and had burned through the bottom of the door into the house and cracked a window. The plastic drain pipe exiting along the east from the interior of the house had caught fire and the fire had followed it right into the house.

*The all-wood 2-to-3-story house with asphalt roof but dried-out wood siding and an upper floor slightly cantilevered slope-side over the lower floor (up to about four feet) ignited as the firefront passed through.

*The houses burned from north to south as the flames got underneath the decks, blew out windows, and rolled into the interior of the houses. It was very hot.

*Stucco, red tile roof. French doors. Wooden fascia. Wood decks. The wooden deck started to ignite, then the wood fascia around the windows, etc., burned.

*One-story house with wood siding and old asphalt roof along a narrow ridge but good clearance. Open wood deck overlooking the slopes from south to west. Many railroad tie walls. Owner did not evacuate. House was saved by professional firefighters with <u>lots</u> of water from fire hydrant.

*One-story Spanish style stuccoed house with tile roof and extensive vineyard greenbelts and pool. Unattended. Based on common sense rules, the house should not have burned but its Achilles Heel may have been the small, wooden deck facing the downhill side of the house. It, as well as the trees below it, caught fire when a large three-story house that was located sideslope below Rambla Pacifico burned down.

*The house next door caught fire and thereafter the wooden deck of their rental house also caught on fire. Fire trucks at Hellstein's house filled up with water from pool and were sent over and extinguished the fire on the wooden deck, saving the house.

7. What about Wood Fences? Railroad Ties? Firewood?

If your house is unattended during a wildfire and there are attached or close-by wooden fences or wooden decks, the chances are great that your house will have turned to ashes when you return.

Just think about it. Would anyone in their right mind remove all flammable vegetative fuels (both native and landscape fuels) from around the house as required by fire code, and then send them through a chipper to refabricate them as highly flammable (but legal) wood fencing, railroad ties close to or even attached to the house? If feasible, replace the wood fences with stone walls.

Eyewitness testimony:

*"I made it back, avoiding the police lines, and saved my friend's house by knocking down the burning wooden fence adjacent to the house."

*After exiting his basement after the firestorm had passed, he restarted his pool pump (fed by the 1,600-gal. gravity fed tank) and doused the ignited railroad ties and wood fence. He continued to knock down the flare-ups of the railroad ties during the night.

*They believe that their clearance and removal of the many pine needles prior to the fire saved their home, but admit that it is a bad idea to have railroad ties or telephone poles for hillside stabilization or retaining walls on slopes, as these kept burning and endangering the house.

*They saved the adjacent motorhome and adjacent house which had only about 15 feet distance to the fully engulfed house. Fortunately, a concrete wall between both houses protected the two off-duty firemen from the radiating heat of the burning home while they aimed a stream of water at it for about twenty minutes from their fire hose connected to the fire hydrant at the street. If it would have been a wooden fence instead of a concrete wall, the adjacent home and motorhome would have also burned.

*The trees and other vegetation seemed to be at once on fire, and fire personnel started hosing down the trees until they ran out of water. The vegetation then caught the wood fences on fire and all these flames caught the houses on fire.

*The house caught fire after 2300—more than five hours after the firefront had passed—as the railroad ties behind the house burned and "lit up some plants."

*Late at night, after the firefront had passed and the onshore winds had put an end to the fire, a firetruck from the nearby station suddenly pulled up, rolling out hoses. He stopped them, asking what is happening and was told that the Fire Department was receiving calls from people below, being concerned about the fire on the hillside, probably from reigniting railroad ties. Tired, but being concerned about the heavy erosion water from a firehose would cause on the hillside and knowing that the railroad ties would just constantly reignite after being watered down, he promised to smother them with soil, putting on his boots, grabbing his shovel and starting to do so before the fire personnel was willing to leave.

*A large pile of firewood within about twenty feet of the older wood house was burning, and a fire captain advised them to scatter the burning firewood as its radiation heat (and convection heat, depending on the winds) could catch the side of the house on fire and blow out its windows.

*"Being off-duty, I made my way down to my home and evacuated my family. I then began recon and structure protection of my neighborhood. As a single resource I was able to extinguish many fires on fences and bushes close to homes."

8. What About Propane Tanks?

Turn off the gas valve before evacuating. Propane tanks are potential designs for disaster. If at all possible, provide a fire-safe zone of at least twenty feet around all tanks or build a concrete wall within five feet of them and keep the surrounding area free of flammable items. This includes all flammable materials inclusive of sheds and homes.

Eyewitness testimony:

*As the mobile home burned, the propane tank line separated, spewing gas and caught the pine tree on fire.

*"After I evacuated and looked back. I saw the hose of a propane tank shooting blue flames everywhere."

*"It was dark in the basement but I could hear the wind howling and propane tanks exploding in the distance."

*All trees (eucalyptus and pines) were blazing. To escape the flames the CDF truck backed into the driveway courtyard in front of the house where it was partially protected by low concrete walls. The heat was very intense and the garage was on fire. The 500-gallon butane tank filled with about 300 gallons of gas suddenly blew its lid (safety seal) with a loud explosion. For the first two hours the tank whistled loudly (still had lots of pressure), sending out flames. For the next two days a flame up to eight feet high lit the area. The flame came in very handy at night when Gil was patrolling for and fighting spot fires.

*The house above was still crackling with flames and sending down firebrands, but the winds had died down. Earlier the water heater from the house had exploded and hurled through the air, landing in front of their house as 15-to-20-foot-high flames from the gas line shot into the air.

9. What About Mobile Homes?

They are potential designs for disaster, as they are largely located on small lots with often not well-maintained, limited defensible space, no garage to protect the cars, no proper clearance from propane tanks or any flammable materials. Largely wooden steps lead to small wooden decks and the front door. They are the first to burn as a firefront goes through so that few are ever saved in a wildland fire, whether it is in a desert, chaparral or a forested environment. If they are on a sturdy enough foundation to withstand the fire winds and escape direct flame impingement or radiating heat sources, the uncountable firebrands raining down on them will ignite any flammable fuels. Once ignited, the "dancing" lines of propane tanks will then spew fires in all directions and other tanks will blow up as the heat intensity of a now self-feeding firefront increases.

Eyewitness testimony

*"You could hear the propane tanks going off. It sounded like bombs and there were big balls of fire in the sky afterwards. You could hear the booms and you know another house (mobile home) was gone."

*After a MH ignited, it quickly spread the fire. The propane tank gas line, up to this point attached to the MH, was now separated and spouting flames for many hours as the gas valve had not been turned off at the tank. With the pressure originating from the tank, the largely flexible gas line whipped around in the air, spreading flames in all directions.

*The side slope situated, unattended mobile homes were protected from direct flame impingement by a well-maintained uphill firebreak in excess of 100 feet and the all-around removal of flammable landscape fuels. However, they had no chance of survival when the firefront, moving downhill from the top of the mountain, showered them with firebrands large and small.

*"Especially during initial attack operations, the fire crew was exposed to heat and smoke from various hazardous sources including but not limited to houses, vehicles, vegetation, sheds containing unknown chemicals, as well as fiberglass boats and recreational vehicles."

10. What about Visibility? Firebrands? Smoke? Other Hazards

Firebrands, carried by the fire winds, can literally rain down on a community ahead of the firefront and ignite any receptive fuels they find. Many homes that could be easily saved, if attended, are often ignited by firebrands and finally burn down many hours after a firefront has passed. Burning structures then produce more firebrands during their burnout time that can last for many hours.

Smoke is a real hazard during wildfires and it is therefore recommended that only able-bodied and properly dressed persons remain behind during a wildfire.

Eyewitness testimony

*Visibility was 0 in most areas of the fire."

*The fire was spreading as a result of flaming embers raining from the sky.

*Firebrands rained all around us. There was no actual firefront.

*The fire burned the woodworking shop north of the house and his antique car that sat adjacent to it and right in front of the propane tank. He watched as the thick rain of flying firebrands was being pushed underneath the car by the strong winds, igniting it.

*Smoke got extremely intense and Gil ran up and down the road to find a place to breathe. Gil jumped into the CDF truck as instructed.

*"At first the wind initially was so strong that it blew out the tree fires. The sound of the firestorm was unbelievable, like out of one of the horror movies but then the wind subsided. There were still red ashes everywhere. But luckily the fire storm was over and the burning embers put themselves out."

*A helicopter dropped a load of red material (phos-chek?) above Lamplighter Lane (below his house). He saw only one drop the whole day. A siren came on when the load was dropped.

*Then they put the pool pump on a cart with wheels and brought the pump up the steep driveway of Bill's house because he had a pool. The large house above it was burning and was sending showers of firebrands downhill to Bill's house. They were afraid that if any of the houses on upper Villa Costera caught on fire, it would cause a chain reaction. They sprayed the back of Bill's house while the firebrands were raining down.

*After the fire storm had passed, Tony was bombarded by firebrands for a long time. Many houses that burned later were ignited by firebrands. His own deck was scorched by them. Three structures were lost south of PCH (along the beach) because of firebrands.

11. How Shall I Be Dressed if I Don't Evacuate in Order To Safe My House?

Wildland firefighters try to wear protective clothing (PPE) that can vary greatly between different fire departments but is generally designed to provide protection against burn injuries that result from direct contact with flames and transfer internally generated heat to minimize heat stress injuries. It must be remembered that most injuries to firefighters are due to heat stress, not burn injuries. On the other hand the worst burn events occur with inexperienced homeowner firefighters as they are generally not properly dressed to fight a fire**.** Sturdy shoes/boots, long pants preferable jeans, a long-sleeve shirt, a bandana/face mask, goggles as well as water are the minimum requirements if a homeowner decides to stay with his or her home in the last minute. Cotton fabrics are preferred to synthetics that may melt on the body.

Besides flame injury another type of burn injury is the inhalation burn. This is mostly seen in firefighters that have inhaled superheated air. One good indication that a person may have a supraglottic (above the glottis) heat injury is swollen lips. In this case, advanced airway interventions may have to be done soon. If the patient has severe shortness of breath he/she may have to be treated with high flow oxygen. Protecting the airway from extremely hot air is always a firefighter's primary concern. Breathing through a wet shroud or bandana exposes the airways to hot, moist air, which can be more harmful than hot, dry air. Avoid breathing through wet cloth but protect your face. A wet bandana or wet cloth can be used to cover the nose and mouth to reduce inhaling smoke after the flame and heat of the fire have passed.

Breezing largely through the nose, firefighters can survive inside temperatures of 175-190^{o} F (92^{o} C) such as in fire shelters for up to 30 minutes without serious injury. How is this possible and for how long? Air, fortunately, is a poor conductor of heat and the upper airway is very efficient in thermal or heat exchange. For this reason a healthy person in a fire shelter can survive breathing such superheated air. Although most of the injuries to the respiratory tract are therefore generally mild and involve only the upper airways, anyone with a significant history of exposure should receive a medical evaluation as soon as possible. Thermal injuries to the respiratory tract can be insidious, with a delayed onset of respiratory distress after contact with superheated air. Significant respiratory distress may be present as late as 24 hours after the exposure. Thermal airway injury is always associated with edema, which can rapidly occlude the airways.

In stark contrast to the higher temperatures generally required for respiratory tract injuries, soft body tissue thermal burns can already occur when the skin is exposed to temperatures above 115^{o} F (46^{o} C). At temperature exposure greater than 120^{o}F for three seconds, a child's skin can be burned severely enough to require surgery.

Eyewitness testimony

*The woman firefighter told her to get out of her dress and put on jeans and boots if she wanted to assist. She then watered down the large wooden deck, changing at the same time into jeans. Because the road is wider at her house than most other parts of Rambla Pacifico, fire equipment was parked there everywhere (which probably helped save her all wood house and wood decks).

12. What about out of Area Firefighters? FIRESCOPE? Local Firefighters?

Homeowner Comments

*There was a command system but no plan. There is a universal problem with FIRESCOPE. They have to work towards effective deployment or it is a waste of men and equipment. We have huge losses because the strategy is not effective. Prevention-Strategy-Tactics. Fire Dept. Risk Analysis: Clearance, Water, Roads, Communication, etc.

*With FIRESCOPE, once an area is assigned in a fire, the local Fire Department (even if it would b prepared), loses control of that area. State legislation is needed for local units to take over control of an area as fire liaison and supervise and direct out-of-area firefighters. The local firemen, if prepared, should input the local knowledge and strategize.

*The first fire engine showed up at about 2300 (the firefront had passed about 1615). It was not local. None of the firemen knew how to get up or down the roads. They did not know where they were and asked for drinking water, as they had none.

*After midnight but by about 0200 hours, water had returned. Someone had found firemen within walking distance sleeping, who said that they could not come to help because of downed power lines. They also did not know that some water pressure had returned to hydrants. Residents cleared the power lines from the road as well as the road and a fire truck came up to mop up.

*At about 1800 after the home was saved, the fire chief and firemen asked the owner how to get to the beach and where the roads went to. Rodger told them that they could not get to the beach anymore and explained the road system.

*At PCH firemen told people they cannot do anything to save the houses in the hills because they have no water.

* Fire Camp 8 was not overall safely maintained and several structures and woodpiles burned.

* Firemen were worn out but saved the house. There were too many fires. Firemen from different jurisdictions could not get together and could not get organized fast enough. The fire was just too overwhelming for them.

*The firefighters that helped save the house were magnificent. They were from Redbluff (CDF?). They "had balls" and knew what they were doing in contrast to other firemen that ran and hid. None of the firemen knew the area. Their (Redbluff) engines kept coming back at night and filling up from the hydrant in front of the house until 0100 when the water failed.

*The L.A. County Fire Incident Investigation Team came a few months after the fire to investigate the burning of the Montebello rig and told Bernie that the assisting agencies are simply not trained to fight these wildfires.

*Firemen had very poor communication and were ill-prepared to fight this kind of fire. Out-of-town firemen had no maps and did not know the area. The big fire trucks were ill-equipped for the area, and it seemed to be like a big McFire (McDonalds) Department, everything the same, not geared to local needs.

*When firebrands started to float down on the neighborhood later at night and threatened to ignite it, he drove around looking for fire trucks and found firemen sleeping. He asked/told them that neighboring houses are endangered and are about to burn and that the house next to him had pool which he already had used. The firefighter crew came down with their truck and saved the neighbor's house using the pool water and prevented the fire from spreading to other homes.

*Having ignored the mandatory evacuation order he immediately went with his jeep looking for firefighters to provide a firetruck for his home as he knew that the fire was coming over the top from Las Flores Canyon. He found three fire chiefs (white shirts, etc.) and urgently demanded a fire truck. One of the chiefs asked him "What roof do you have?" He answered "Rock roof." "What house?" He answered "Stucco." "Clearance?" "Good all-around clearance with ice plant slope." The chief then answered "You will get a truck," and radioed to get a fire truck.

*I still cannot believe that we, as precinct workers in the Carbon Canyon Fire Station, received no warning whatsoever about the fire which consumed all three of our homes."

* "I rushed to the fire department up the highway at Carbon Canyon to try and get a nozzle for my fire hose. The sky was growing dark with smoke and falling ash. There was mayhem at the fire station with huge diesel trucks idling noisily in a line up the street. The fire I think may have already been raging in Carbon Canyon. All the truck bays were empty in the fire station, and lockers were hanging open. Equipment was strewn everywhere. I told firemen hurrying past that I was trying to save my home, and needed a nozzle for a 2.5" hose. Finally one fireman grabbed my arm and pulled me over to a locker and gave a huge nozzle for the hose."

Photo-documentation

1. Protecting a Stucco Home More Effectively From Fire Intrusion

A. Smoke Coming from Chimney of Stucco House after Firefront Had Passed

***Malibu:** Using backroad trails, he got around the police lines on his bike. As he approached his new, fire-safe, all stucco house with all-around good clearance, he saw smoke coming from the chimney. He ran into the house which was full of smoke and realized that fire had gotten from the outside into the wood frame from below. The interior not being completely finished, he was able to expose the affected wood frame areas and extinguish the fire.

Left: The low-growing groundcover that was planted at the base of the house adjacent to the weep screeds caught on fire.
Right: Weep screeds and the frame were repaired and the affected side of the house restuccoed.

B. Protecting weep screeds on a new home

Left: A fire-safe designed home with stuccoed decks and weep screeds protected along concrete steps and concrete exterior flooring (red arrows).
Right: However, weep screeds located above a proposed planter at the entrance door (red arrows) may be the Achilles heel in later years as the planter accumulates dead debris. Such weep screeds at the base of stucco foundations are generally only used on walls constructed with wood framing, and are not required on stucco-coated masonry structures or when adhered stone is installed over masonry. Future owners may not be aware that the holes in the weep screeds as indicated by the many red arrows, while allowing moisture to drip from the wood frame covered by the stucco, also provide an entry for flames into the house.

C. Lighting fixtures as possible fire entry in a "fire-safe" stucco home

Any opening in a wood-framed stucco home is a potential entry for flames. This photo shows the lighting fixture pierced roof of the open garage underneath the deck. As an adjacent large tree burned, direct flame impingement melted the lighting fixtures and gained entry into the framing.

2. Protecting Windows from Fire Entry

With the windows protected by home-made wooden fire shutters installed from the outside at ground level and inside on the upper floors, this tile-roofed split-level stucco home overlooking steep slopes survived a 10-15 minute fire storm coming down the canyon and also uphill from the creek. Note the heat-cracked windows on the right.

With roll-down aluminum fire shutters protecting its windows, this sideslope home survived the firestorm that overran and engulfed it during the November 2, 1993 Old Topanga Fire.

The fire gained entry into the house at the top of a steep slope without any setback by blowing out windows. With the burned "low-fuel plants" removed from the planter in front of the picture windows, roll-down shutters were installed after the fire along with restuccoing the fire-damaged sections of the house. While shading from the sun is desired for the windows facing a southerly slope, be aware that the enlarged overhang is a potential "fire catcher."

3. Eliminating Flammable Roofs

Flammable roofs have been by far the largest causes of fire losses and fire conflagrations in fireprone wildland environments throughout the fire history of this country. One can only be more fire safe by replacing any flammable roofing material as such roofs are the immediate receptors of fire brands and any other flammable objects landing on them.

1978- Three people watering the roofs of their wood-roof community while they still have water pressure. Two people are watching on the ground. Backyards are planted with low-fuel plants, protecting the uphill facing sides of the homes from direct flame impingement. Little good will this do when firebrands start raining down on the roofs as the wind shifts..

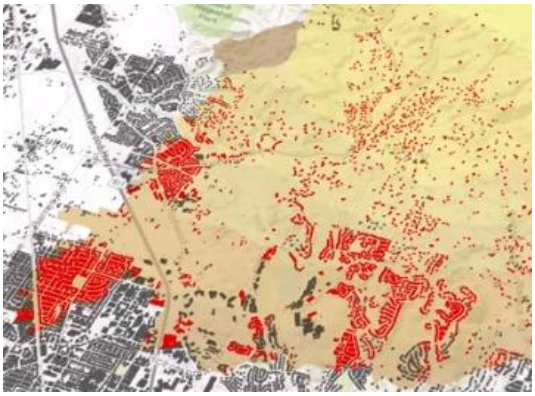
1956 – Destroyed wood frame and wood roof homes.

1978 – A rare sight of a saved wood roof home.

1991 – Oakland Tunnel Fire: Narrow roads, wood houses, wood roofs, wood balconies, many pine and eucalyptus trees.


1999 – Crest De Ville Fire – A small fire quickly destroyed a new wood shingle roof community despite available water.


2007 – Angora Fire at Lake Tahoe – Rebuilding but safely (?) in a high elevation forested environment.

2017 Left: Tubbs Fire (Napa,Sonoma,Lake Counties) spotting across the 101 Freeway in Santa Rosa, N. California.
Right: Red dots indicate destroyed homes along the western front of the fire inclusive of tightly packed red dots in Santa Rosa. – The fire followed a path similar to the 1964 Hanley Fire in which only a few dozen homes were destroyed. Building in fireprone enviroments with little thought about fire safety and past fire history caused a wind-driven spotting conflagration in 2017 which destroyed over 5,600 structures that did not exist in 1964.

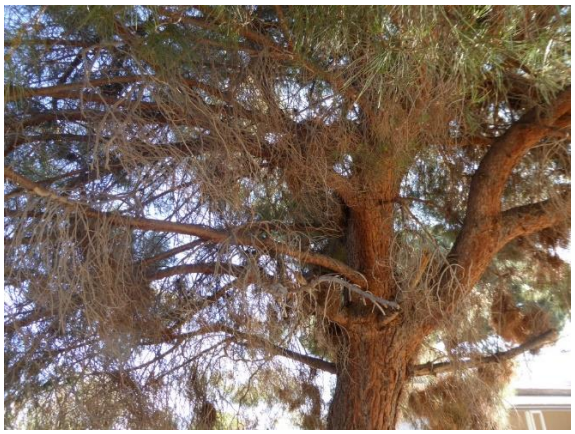

2018 Camp Fire in Butte County, Northern California – During predictable high wind and spotting conditions the fire destroyed 18,000 structures which included most of the town of Paradise. Paradise was also expanded in fireprone enviroments with little thought about fire safety and fire history (above photos from the Atlantic). A special fire prevention fee of $470 mil. spent on prefire fire prevention efforts made little difference in reducing the fire losses or assisting in fire containment.

4. Living More Safely in Mobile Homes in Fireprone Environments

5.


This mobile home and propane tank, maintained by an army veteran, survived a mobile home park fire conflagration.

Another mobile home with the roof covered with pine needles during the height of the fire season.

Left:The large pine adjacent to the above mobile home passed fire inspection as ornamental vegetation while littering its roof with pine needles.
Right: Its interior, largely dead crown poses an exteme fire hazard not only to the above mobile home but to neighboring homes and the mobile home park itself because it can become instrumental in the spread of the fire and in supporting a fire conflagration.

Photo-documentation will be continued as time permits. Photos and input from readers are appreciated.