



Southern California Best Practices

Southern California Wildfires of 2007

1731- DR - CA

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Emergency Services*

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Cover photo: The Witch Fire swept through this Rancho Bernardo neighborhood, San Diego County. The homes that survived had been mitigated using fire-resistant construction methods such as class “A” roofing, enclosed eaves, stucco exteriors and dual pane windows.
Aerial photo, Andrea Booher/FEMA October 31, 2007

Introduction



Southern California is no stranger to wildfires. Beginning in 1923, the Los Angeles Fire Department has collected data recording the largest California wildfires in terms of acres burned and structures lost. Since 1956 there have been seven federally declared wildfire disasters. The encroachment of housing developments into undeveloped land has greatly increased vulnerability of homes and businesses to wildfire. Within this decade alone, Los Angeles, San Diego, San Bernardino, Ventura and Riverside counties were swept with devastating wildfires in the wildland urban interface in October 2003, and again in October 2007.

When the 2007 catastrophic wildfires struck Southern California, the powerful Santa Ana winds caused multiple large wildfires which increased rapidly in size and intensity, throughout the wildland urban interface of seven counties; Los Angeles, Orange, San Bernardino, San Diego, Santa Barbara, Riverside and Ventura. Evacuations, mandatory in some locations, were ordered and activated by the responding fire and emergency management services. The largest evacuation in the history of California took place in San Diego County where more than half a million people were ordered to leave the area. This evacuation effort has been documented as “orderly” and fully tested the capabilities of the first responders.

California counties affected by the 2007 wildfires and locations of the mitigation best practices featured in this report.



FEMA 1731-DR-CA GIS Mapping



New construction continues in Southern California. The dry temperate climate, secluded canyons, hilltops with sweeping ocean views and forested mountain areas attract homeowners and developers. These same attributes contribute to the wildfire risk and vulnerability. Knowing this, the fire service has adopted and enforced stringent building and landscaping standards throughout the state. In January 2005 a new state law became effective that extended the defensible space clearance requirements around homes and structures from 30 feet to 100 feet. The 2007 California Building Code (CBC) and the 2007 California Fire Code (CFC), which establish new standards for fire resistant building materials in wildland-urban interface areas, will both become effective January 1, 2008. These codes apply to all of the declared counties affected by the wildfires of 2003 and 2007.

Fire suppression and fire prevention alone are not enough to protect people and structures from fire. Mitigation actions that are required by the defensible space state law, new building and fire codes, partnered with enforcement and maintenance provide a comprehensive strategy that protects life and reduces property loss.

Mitigation is defined as “any action proposed to reduce risk of future damage, hardship, loss or suffering from natural disaster.”

Where applied, these strategies were successful. A consistent theme among homeowners, real estate developers and fire department personnel was that the “results spoke for themselves.” People once resistant to strict rules and new regulations now refer to themselves as “a convert; a true believer” when speaking of their personal experiences. Don Ceglar, a resident of Rancho Santa Fe, stated that the community’s fire protection standards passed the test with flying colors. “The fire surrounded our community like a doughnut,” he said. “It’s remarkable. It literally looks like someone took a torch and went to the edge of these properties, and the fires just stopped.”

We are seeing progress. More people are aware of mitigation. More are building to higher standards, thoughtful not only of potential losses from wildfires but from all other hazards as well. It’s evidenced by the people we talked to as we researched the successes. Some had realized long ago that they needed to prepare for every type of disaster – Pepperdine University at Malibu is a prime example. The multi-million dollar homes in Rancho Santa Fe in San Diego County are a prime example of thinking and taking action after the 2003 fires. In that instance, enforcement of the highest standards for building in areas threatened by wildland fires came into play.

This report presents the wildfire mitigation strategies that were implemented prior to the Southern California 2007 fires and subsequently tested by the fires. These strategies include defensible space, vegetation management, fuel modification programs, use of fire-resistant building materials, building codes and partnerships with the fire service to monitor the enforcement of the building codes, construction standards and public outreach.

These best practices contained in this report have been gleaned through interviews with homeowners, fire department personnel and real estate developers. Their first hand experiences document vividly the value of taking proactive measures.

Defensible Space and Fire-Resistant Building Materials Save Home from Wildfire

San Diego County

Ramona, CA - On Sunday, October 21, 2007, Lisa LeFors of Ramona, CA heard the startling news about the Witch Fire advancing toward her home and started making arrangements to evacuate. She monitored the radio all day and night and finally, at 2:00 a.m., she gathered up her two dogs and one cat and fled her home.

“I’ve never seen a wind like that,” LeFors explained about the notorious Santa Ana winds. The Santa Anas stoked 23 separate Southern California wild fires to a virtual fire storm for four days before subsiding enough to allow fire fighters to contain the flames and ultimately to extinguish them. The largest of the 2007 Southern California fires, the Witch Fire, eventually burned a total of 197,900 acres. As it grew in size it joined the Poomacha Fire in the north and together the two fires consumed 247,400 acres and more than 1,200 homes.

Ms. LeFors’s adobe ranch-style house was built in 1990 with protection from wildfire danger considered in its design and construction. Besides the



Concrete walkway and ice plant are part of the defensible space around the LeFors home.



This brick walkway served effectively as a fire break. The fire burned to the edge, scorched an area of ice plant, melted a plastic sprinkler head and was stopped from advancing on the home.

noncombustible adobe brick and concrete tile roof, the fire-resistant exterior doors are metal with dual pane glass. The windows, also dual pane, have metal clad frames or are of glass block. Because the house is set in approximately the middle of her 10-acre plot, the land is kept relatively clear around the home’s perimeter. Ice plant, which does not burn, grows close to the house, and brick and concrete walkways also separate the house from other planted areas. There is evidence of the fire’s scorching only up to the edge of the ice plant growth.

Under current building regulations, adobe brick is no longer permitted in most California counties due to potential seismic hazards. Reinforced

masonry (excluding masonry veneers), reinforced concrete block, or reinforced poured concrete walls are among acceptable alternatives to adobe brick. For more conventional wood framed construction, fire-resistant cladding materials such as cement board siding, metal siding, stucco and brick veneers may be used subject to local building department and fire department approvals.

When she realized that evacuation was probable, the first thing LeFors did was to clear out an accumulation of leaf debris from under her propane tank which sits about thirty feet from her house. Between the house and propane tank is a four foot high adobe patio wall running the depth of the house. This wall also serves as a fire-break. LeFors keeps vegetation outside of the immediate perimeter of her house mowed very short with a tractor mower to prevent its becoming a fire hazard. Her tractor repairman told her before the fire “I don’t know anyone who keeps their weeds cut as short as yours.” Following the firestorm that devastated many areas of San Diego County, she’s very happy that she has that distinction. A lack of fuels kept the fires from becoming more intense as they swept over her property.



Metal clad window frames, dual pane glass and masonry window sills helped save this home from fire.



Masonry wall and walkway provide defensible space next to the house.



Scorch marks on the ground show where the fire stopped when it encountered the ice plant ground cover. Propane tank in background was protected from flames by the surrounding ice plant.

One neighbor who stayed in his home instead of evacuating told LeFors when she returned that the flames burned for about two hours before moving on through the neighborhood. Another neighbor’s home burned completely to the ground. LeFors is positive that her house would have burned also if not for the mitigation measures built into her home. As she was cleaning up after the fire, she found cinders on the exterior window sills, evidence that the fire resistant sills and metal clad window frames prevented the fire from entering the structure.

According to CAL FIRE records, the area near the LeFors home was involved in fires at least four times prior to the construction of the home. Fires of record, (300 acres and greater), occurred twice in 1913, once in 1919 and once in 1967. The Witch Fire was the first to test the mitigation measures taken when the house was built and the effectiveness of maintaining a defensible space.

Having avoided the loss of her property, currently valued at \$400,000, during this fire, LeFors is now planning to implement additional mitigation measures. Her first priority will be to enclose the overhanging eaves with non-combustible materials. She also plans to remove more of the foundation plantings and some trees which are too close to the house.

Creating a "Defensible Space"

Take steps to protect your home from a wildfire by taking some simple steps to create "defensible space," an area around your home that discourages fire from coming too near.

Make a plan!

Be aware & take care!

PROTECTION PLAN

- plant fire resistant plants
- space plants to slow the spread of fire from plant to plant
- place woodpiles and wooden picnic tables well away from buildings
- keep roofs and house perimeter free of needles and leaves
- screen openings under decks and attic and foundation vents

- Vehicles:** Keep out of tall grass & shrubs; your car could start a fire!
- Smoking:** Cigarettes can start fires even hours after being dropped or thrown away.
- Fireworks:** not permitted on public lands!
- Chainsaws & equipment:** Use spark arresters, refrain from welding and use of spark-creating machines when fire danger is high

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U.S. WILDLIFE MITIGATION SERIES

100' DEFENSIBLE SPACE Make Your Home FIRE SAFE

Why 100 Feet?

Following these simple steps can dramatically increase the chance of your home surviving a wildfire!

A Defensible Space of 100 feet around your home is required by law. The goal is to protect your home while providing a safe area for firefighters.

- 1 "Lean, Clean and Green Zone"**
 - Clearing an area of 30 feet immediately surrounding your home is critical. This area requires the greatest reduction in flammable vegetation.
- 2 "Reduced Fuel Zone"**
 - The fuel reduction zone in the remaining 70 feet (or to property line) will depend on the steepness of your property and the vegetation.

Spacing between plants improves the chance of stopping a wildfire before it destroys your home. You have two options in this area:

- 1 Create horizontal and vertical spacing between plants. The amount of space will depend on how steep the slope is and the size of the plants.
- 2 Large trees do not have to be cut and removed as long as all of the plants beneath them are removed. This eliminates a vertical "tree ladder."

When clearing vegetation, use care when operating equipment such as lawnmowers. One small spark may start a fire; a string trimmer is much safer.

Remove all build-up of needles and leaves from your roof and gutters. Keep tree limbs trimmed at least 10 feet from any chimneys and remove dead limbs that hang over your home or garage. The law also requires a screen over your chimney outlet of not more than 1/8 inch mesh.

1. These regulations affect most of the grass, brush, and non-wooded private lands in the State. Some fire department jurisdictions may have additional requirements. Some activities may require permits for tree removal. Also, some activities may require special procedures for: 1) treatment and endangered species, 2) avoiding erosion, and 3) protection of water quality. Check with local officials if in doubt. Current regulations allow an insurance company to require additional clearance. The area to be treated does not extend beyond your property. The State Board of Forestry and Fire Protection has approved guidelines to assist you in complying with the new law. Contact your local CAL FIRE office for more details.

July 2007

Educational materials developed in partnership with FEMA, Cal OES and CAL FIRE to support the defensible space mitigation strategy.

Multiple Mitigation Measures Saved Home from Wildfire

San Diego County

Jamul, Calif. – In October 2007, fire surrounded the home of Bob and Suzy Bullock, who live some 25 miles east of San Diego near Jamul. They evacuated, and when they came back, they found their home intact – protected by all the measures they took in advance when building their home.

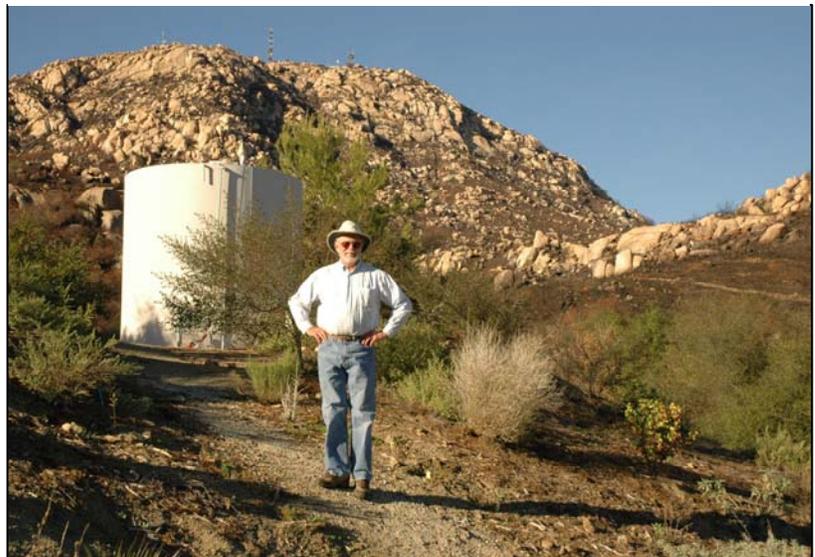
On a 10-acre site in the wildland area above Deerhorn Valley, the Bullocks' home sits amidst scorched hillsides and gulleys on all sides. Santa Ana winds drove the Harris Fire, one of the biggest fires of the Southern California wildfires in 2007, through the area.

The fire destroyed 19 homes within sight of the Bullock property.

A wide swath of defensible space planted with fire-resistant vegetation that is watered regularly with a special irrigation system helped save their home. So did its construction – a tile roof with boxed-in air vents that repel flying embers, stucco walls, concrete aprons around three sides of the structure, and the asphalt driveway at the back of the house. The Bullocks also have a fire hydrant (required by the county as a condition of the building permit) fed by water from a 10,000-gallon water tank.



The home of Bob and Suzy Bullock – untouched by the Harris Fire that burned all around it in October 2007, overlooks Deerhorn Valley east of Jamul.



Robert Bullock elected to have a 10,000-gallon water tank installed, providing firefighters who protected his home with twice as much water as is required by San Diego County for houses in the wildland interface. The Bullocks said they learned that other people lost water tanks because trees by the tanks caught fire, so the pine tree by their water tank will be removed.

The Bullock's firefighting system came into play when Lake Tahoe area firefighters used it to protect two of the area's homes (both owned by the Bullocks). "We came into your home

through the open bedroom door,” said Steve Bevenage, captain of Lake Valley Fire Protection District crews who protected Jamul and Deerhorn Valley homes.



Bob Bullock points out the extent of defensible space on his property to mitigation specialist Michael Raphael, left. In the distance is the Deerhorn Valley area.

“We closed your bedroom windows and all blinds,” Bevenage said in a communication to the Bullocks found at their home when they returned. “Fire burned all around your exterior landscape, except for a small area next to your drive,” the note said, ending with: “Great job with defensible space, fire pump, fire hose, thermal gel and a reducer on your water.”

The Bullocks’ advance preparations included coating their house with a fire-repellent gel. The gel is applied as a mist with a garden hose. The “fire-blocking gel” should be rehydrated with a misting every eight hours. Firefighters from Lake Tahoe re-misted the gel while the Bullocks were gone, they said.

The concrete aprons extend 10 to 21 feet from the outer walls of the house. The 16-foot-wide asphalt driveway behind the house serves as an apron there. The Bullocks also have an irrigation system installed for watering plants in the defensible space.



This is the hardscape at the back of the Bullock home. This area is adjacent to the asphalt driveway, which also acts as part of the hardscape that surrounds the house.

“My wife was really concerned,” Dr. Bullock said, “when we were designing the house.” She researched every source for information about measures to take in constructing their home. Included was defensible space. Greg Rubin of California’s Own, an Escondido-based landscape design company that specializes in preparing defensible spaces for homes, especially those which border the wildland urban interface where the potential for fire exists throughout the year, cited the Bullock home and their preparation for fire as a classic example of doing all the right things.

“Directly around the house, we like to do mostly hardscape, at least create a concrete or gravel apron that keeps the flames away from the eaves,” he said. The “hardscape” at the Bullocks’ home are the aprons and driveway.

“Native landscapes require an organic mulch in order to prevent weeds, control erosion, hold moisture and provide some trace elements,” said Rubin. “Of all the organic mulches, the shredded redwood bark (known also as ‘gorilla hair’) appears to be the most fire-resistant, once it has been matted down after a few irrigation cycles. It also seems to have the best physical and biochemical properties for natives,” Rubin said.

“As far as the plants themselves, hydration is the key. What is significant about natives is that they require very little supplemental irrigation to stay hydrated, and they hold onto that hydration. Many conventional exotics, on the other hand, take much more water to be hydrated and tend to lose the water rather quickly during the fire and then burn up. The mulch itself also seems to benefit from bimonthly light watering.”

I don't think it's a bad idea to give the landscape a good dousing right before the fire if there is time to do so, because the mulch will retain the moisture.”



Shown is a section of defensible space and its irrigation system, and proximity to the burn area at the top of the photograph.



Suzy Bullock is ecstatic about how things worked out at her home when the Harris fire came through their area in October 2007. Greg Rubin, right, fire-safe plant specialist whose company created defensible space there, said all Bullock needs to do is water the defensible space vegetation regularly.

On Nov. 11, 2007, Rubin toured the property with Bob Bullock, remarking that there is nothing Bullock needed to do other than maintain the defensible space by watering plants there every 7 to 10 days. He added that, although much of the vegetation closest to the burn areas was scorched, most or possibly all of the plant life will come back.

The next thing the Bullocks will do to enhance protection of their property is remove a pine tree that was growing next to the water tank behind and upslope from their house.

That decision was made when the Bullocks found out that vegetation by a water tank could ignite, destroying the water tank, as had happened on other properties in other fire areas.

The Bullocks know they are lucky that nothing happened, with respect to the pine tree, but they believe it is not worth the risk of keeping the pine tree just because it looks good set by the water tank. They also know they are lucky that a wood table inadvertently left next to the house did not catch fire.

The overall cost of mitigating their house with aprons, defensible space including the irrigation system, well, fire hydrant, fire pump, and fire hose totals \$85,000. The cost of constructing their house in 2003 was \$600,000. The Bullocks' insurance company estimated late in 2007 that it would cost approximately \$775,000 to replace their home if it had been a total loss. That makes the cost benefit ratio 9 to 1. The house is insured for \$800,000, Bullock said.

The overall cost of mitigating their house totals \$85,000. The Bullocks' insurance company estimated late in 2007 that it would cost approximately \$775,000 to replace their home if it had been a total loss. That makes the cost benefit ratio 9 to 1.

The Bullocks own an adjacent 10 acres and have a rental house there. It also has defensible space with its own irrigation system, and the house is also fully mitigated. The house was untouched by the fire. Lake Tahoe firefighters protected it with the Bullocks' firefighting system.

The Bullocks story serves as a classic example of what can be done, and perhaps what should be done if one is to live in areas that are threatened by the ravages of wildfires. It does not mean



Mitigation elements shown include boxed-in eaves with bird stops, stucco exterior (no wood on the outside surface of walls, including trim around windows), double-pane windows, fire alarm (the home has an interior sprinkler system), glass brick (at left), hardscape between the house and defensible space, and the edge of defensible space itself.

that the property is absolutely fire-proofed, but does mean that the Bullocks reduced their vulnerability substantially. At that, they are fully protected by fire insurance, and when fire comes, they evacuate. The Bullocks encourage everyone to consider what they may do to protect their homes and consider that the extra costs are well worth it.

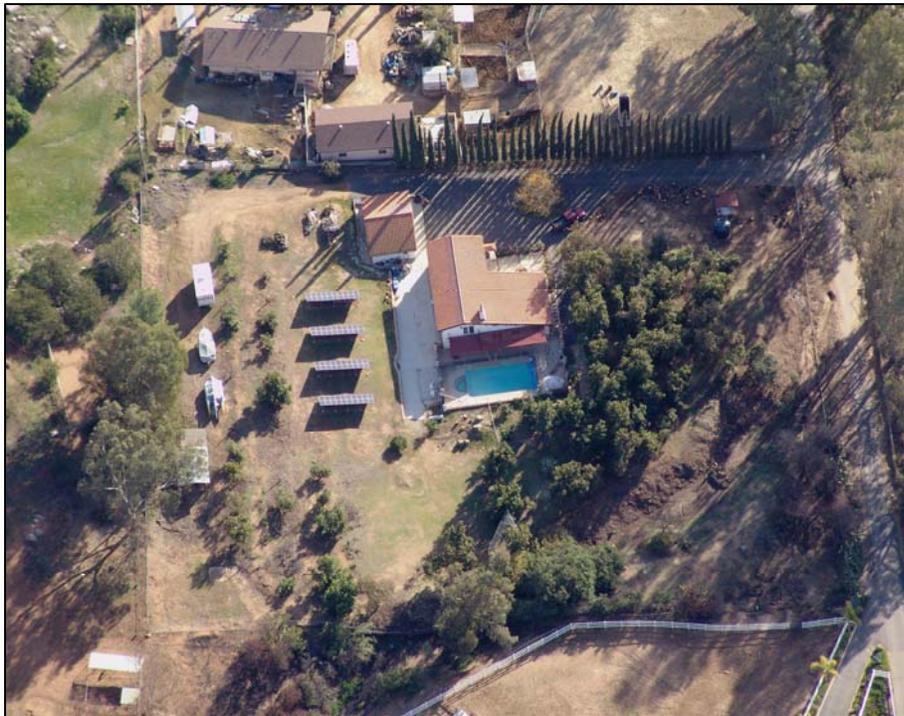
“We love it here. We wanted to make sure we did everything right,” Bob Bullock said. “I’m glad we took the steps we took.”

Poway Home Spared by the Witch Fire

San Diego County

Poway, Calif. - Ken and Bonnie Constable will never forget the terror they experienced the morning of Oct. 23, 2007, when a wind driven wildfire came up to their front yard. Remarkably, their home was spared, and even though they lost a well house, a water tank and many trees, there were no major damages to the house itself.

“We never thought we’d get a fire this close,” said Bonnie Constable, “We are very thankful we still have a home.”



An aerial view of the Constables' property – Photo courtesy of Aerial Advantage Photography.

The Witch Fire, also known as the Witch Creek Fire, originated in the Witch Creek Canyon near Santa Ysabel and threatened many communities in central San Diego County. The fire burned 197,990 acres, destroying more than 1,000 residential structures and 509 outbuildings. The Witch Fire followed almost the same ravaging path taken by the Cedar Fire in 2003 according to the California Department of Forestry and Fire Protection.

The Constables received the reverse 911 call to evacuate the morning of October 22 before the fire had reached their area. By that Monday night, they could see the fire coming over the hills, so Bonnie took the dogs and left to stay with her mother in the southern section of Poway. Ken decided to stay and was awakened in the middle of the night by one of his neighbors, warning him that the fire had reached the west and south side of his property. Ken, his sons, friends, and some men in the neighborhood helped firefighters combat the fire as much as they could. They were successful in keeping it from all of the homes on their street.

The Constables have lived in their home in Poway for almost 30 years. They bought the home three years after it was built and have done many improvements over the years to make it safer. The 2,800-square-foot home, which is solar-powered, has a stucco exterior and a Class A fire-resistant (clay tile) roof. An asphalt driveway in front of the house, concrete slab on the sides and

a pool area in the back separate the house from fruit trees and grassy areas, creating a defensible space. A defensible space around a home provides firefighters enough space to work, and it also prevents fire from transferring from one fuel source to another.

One of the main reasons why the Constables' home did not burn was due to the fact that they removed weeds from their property, considerably reducing ground fuel. This prevented the fire from propagating too fast. Ice plant at edges of their property also proved to be efficient in stopping the fire, according to Ken Constable.

A defensible space around a home provides firefighters enough space to work, and it also prevents fire from transferring from one fuel source to another.

The Constables learned that the pine trees in their front yard were extremely flammable. They were burned so badly they had to be cut down. They grow a variety of fruit trees, including avocado trees. They were happy to see that the avocado trees were not as flammable as the pine trees.

Additional mitigation measures being planned are to install a pump for the swimming pool enabling them to use the 27,000 gallons of water for firefighting and to enclose the eaves on all sides of the house. They are committed to doing what they can to make their home safer.

"I'm sure we'll be better prepared next time," said Ken. Bonnie agrees as she reflected on recent events. "You always think of a lot of things after the fact," she said. "There's always more you can do to protect your home, but you do what you can."



The value of the property almost 30 years ago was just under \$200,000 and it has increased in value to nearly \$1,000,000. Besides the irreplaceable personal things that can't be measured in a dollar amount, the preventive measures taken by the Constables helped save their largest investment – their home.

Ken and Bonnie Constable stand on the asphalt driveway in front of their home. Evident fire resistant measures are stucco exterior, Class A tile roof and clean, defensible space.

Vegetation Made the Difference

San Diego County, CA – Herb Peters is convinced ice plant placed on three sides of his Rancho Bernardo home early in 2007 was a major reason his 1,500-square-foot house did not burn when the Witch Fire roared through his neighborhood during the morning hours of Oct. 21.

The ice plant and more than 50 feet of wax-leaf ligustrum hedge that lines the north side of his elevated corner lot, facing in the direction from which the Witch Fire came, “had a great deal to do with saving our house,” Peters said.

Many homes in the area where Herb and Jill Peters’ home is located burned to the ground. Homes directly across the street were destroyed. Several homes burned to the ground east of the Peters home. The Witch Fire burned several dozen homes in the area west of Interstate 15.

In April, Peters removed an older type of ice plant that had been growing on the property for well over 20 years and replanted the slopes with 180 flats of the new ice plant. The ice plant is watered three times a week and is “very fire-resistant,” Peters said.



Herb Peters (shown after the fire) chose a special type of ice plant to cover three areas around his home, including the east-facing slope that faced the oncoming Witch Fire.



A view of the burned area from Herb and Jill Peters’ backyard and Interstate 15, which courses east of the trees. Also viewed are areas blackened by the Witch Fire east of the highway.

Removing flammable native vegetation and replacing it with low-growing, fire-resistive plants is one of the easiest and most effective ways to create a defensible space, according to the Fire Safe Council. Fire-resistive plants grow close to the ground, grow without accumulating dead branches, needles or leaves, and are easily maintained and pruned, the council said. Some of the more common species of fire-resistive plants include ice plant, periwinkle, rosemary, and African daisy, the council said.

The fire hit the area between 3:30 and 4 a.m. Herb and Jill, “got the call to evacuate” while they were in Omaha, Nebraska, visiting with family. Peters’ son was taking care of their home. A

neighbor across the street called and said burning palm tree fronds “were flying.” Flames and embers blew under tiles of neighboring houses, and the homes “blew up,” the neighbor told Peters.

Houses with asphalt shingles in his neighborhood “are still standing,” Peters said. “Winds were blowing through here at 80 to 100 miles per hour.” He added that “some beautiful multi-million dollar homes” in Rancho Bernardo were destroyed during the conflagration. Houses burned on every side of his home. Peters added that wooden fencing on both sides of West Bernardo Road, a bit more than a block away from his home, acted as a “wick,” or fuel, that fed the fire.

Removing flammable native vegetation and replacing it with low-growing, fire-resistive plants is one of the easiest and most effective ways to create a defensible space.



Trees (beyond Herb Peters) were blackened by the blaze, and later trimmed, but apparently posed no threat to his home.

At one point, the Peters were told their home “was gone.” When they returned to Rancho Bernardo, they “really expected it to be gone,” Peters said. “We were euphoric when we saw it still standing.”

“Everything went wrong” when the Cedar Fire roared through San Diego County in 2003, Peters said. “This time, we were organized, and everybody did much better.”

The Witch Fire (also known as the Witch Creek Fire) was the most destructive of 24 fires that burned in seven counties in the area declared by the president as a disaster area.

The Witch Fire destroyed 1,125 homes. Another 77 homes were damaged, 499 outbuildings were destroyed, and 26 outbuildings were damaged by the conflagration that blew over Interstate 15 to burn into Mr. and Mrs. Peters’ neighborhood, according to Cal Fire, the state fire agency.

Two people died because of the fire, 39 firefighters were injured while fighting it, and 21 civilians were also injured, Cal Fire reported. The Witch fire burned 197,990 acres – more than double the acreage burned by the second biggest blaze, the Harris Fire in southern San Diego County.

Cinders bounced off the asphalt shingle roof of his home without causing damage to the roof, only burning a piece of outdoor carpeting on the patio, Peters said. Although Peters considers the asphalt shingle roof on his home as “quite fire-resistant,” he will replace it, as soon as he receives his insurance settlement, with new asphalt shingles with a higher fire-resistive rating. He also will install rolls of new R-30 rated insulation in the attic.



Peters said it cost less than \$6,000 to landscape his property with fire-resistant vegetation. That's far less than what it would cost for Herb and Jill Peters to rebuild their home. Based on construction costs in 2007 (which can be \$250 per square foot in some San Diego County areas, and up to \$307 per square foot), Peters estimates it would cost \$250,000 to \$275,000 to replace his home.

Weighing what he has done and will do, Peters envisions there may be more wildfires and that he should be ready.

Herb and Jill Peters' home and protective ice plant are shown just across the street from one of the neighboring homes that were destroyed by the fast-moving Witch Fire.

New Developments' Construction Standards Require Wildfire Mitigation

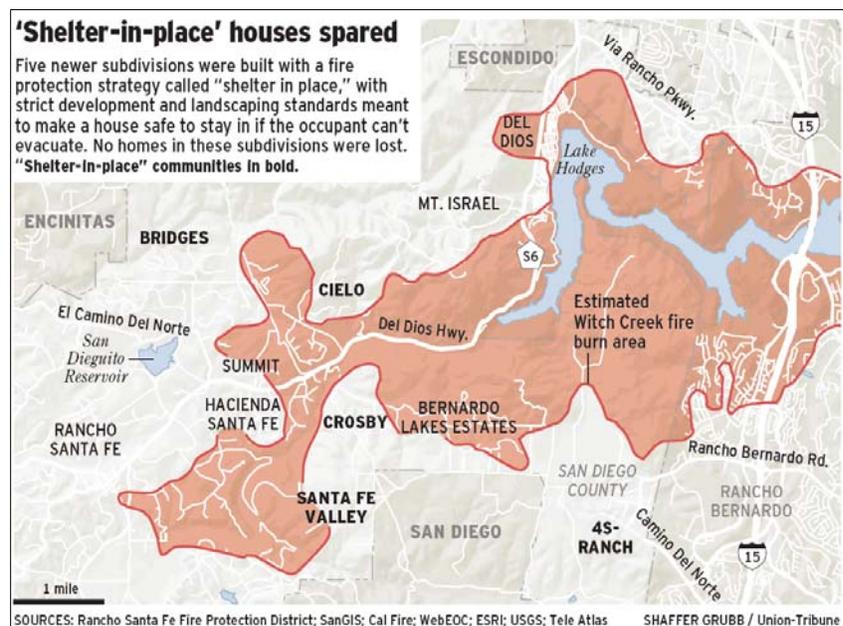
San Diego County

Rancho Santa Fe, Calif. – More than 2,460 multi-million-dollar houses, built to the highest construction standards possible including expansive defensible space around and within the home development areas, survived extremely well when the Witch Fire stormed through the area in October 2007.

The developments – the Crosby, Cielo, 4SRanch, the Bridges, and Bel Etage (also known as Santa Fe Valley) – were surrounded by the fire, driven by high winds, as it swept through the northern San Diego County area. The blaze burned up to plants on defensible spaces and stopped. Embers blown into areas of the estates bounced off tile roofs with boxed-in eaves, stucco walls, patios and other areas, and died out without leaving more than incidental damage, basically scorched plants. A half-dozen charred embers the size of footballs were found in the Cielo estates, and “nothing was burned,” said Ken Crosby, one of the realtors for the estate areas. When the Witch fire rolled through the area, 55 homes were destroyed elsewhere in Rancho Santa Fe.

“I can’t believe we survived,” said Lauren Weaver, a realtor who lives in the Crosby and owns a second house on the perimeter of the development. Both homes were untouched. She and her family evacuated as the Witch Fire approached, just in case. That decision was made because the “shelter in place” aspects of the developments had not been tested.

The five Rancho Santa Fe developments, begun just three-plus years before the Witch Fire came, basically set construction standards on the “shelter in place” concept developed in Australia. The standards for construction and mitigation, including mandated interior fire sprinklers, extensive defensible space and use of fire-resistant vegetation, are the “toughest in the country,” according to Cliff Hunter, fire marshal for the Rancho Santa Fe Fire Protection District, which provides fire protection for the five developments.



The Witch fire burned around much of the five shelter-in-place estates as shown in this graphic produced by the San Diego Union-Tribune.

The strict development standards make homes in the shelter-in-place communities safer places to stay if residents are not able to evacuate from the areas, according to fire officials. They advise people to evacuate rather than stay to fight fires or simply shelter in place because their homes are considered to be safe refuge.

USA Today said the “wealthy developments” emerged as “one of the bright spots in the firestorm of destruction that whipped Southern California last week. (The developments) may pose a lesson for the future for those who choose to make their homes in areas where wildfires are likely.”

The estate homes were constructed with materials and techniques intended to make the structures as resistant as possible to effects of wildland fires. The areas were subject to strict limitations on landscaping so that combustible vegetation – fuel for fire – is kept well away from homes. Only slow-to-ignite plants may be planted nearer to houses. The standards are strictly maintained by the Rancho Santa Fe Fire Protection District’s fire marshal.

Cliff Hunter, fire marshal for the Rancho Santa Fe fire department, said the developments are governed by the toughest residential fire codes in the country. Erwin Willis, the department’s retired fire chief, is credited as being the driving force behind setting the high standards for fire resistive measures for the five communities. Hunter is the person who walks home sites with homeowners, specifying which plants may be placed on yards, and how far plants must be from houses.



Steve and Sheri Sargenti look at defensible space behind their home.

Mitigation was “definitely a factor” in the decision by Steve and Sheri Sargenti to buy a home in The Crosby development in Rancho Santa Fe.

The Sargenti home is on the eastern edge of The Crosby. There is a wide swath of defensible space adjoining the backyard. Smoke and ash came into their house through the drier vent and there was smoke in the garage, Sargenti said. The interior of the house was chemically “sponged” to clean it, Sargenti said, adding “everybody (in the area) got smoke.”

The couple said they attended a program staged by the Rancho Santa Fe Fire Department to explain how the shelter-in-place program works. Steve and Sheri Sargenti came away with a full understanding of what the concept of “shelter in place” means, and what they should do. It was there they learned that the concept had not been tested in the United States and that they should “get out early” if they chose to evacuate, and what to do if they stayed.

“When we were told the ‘shelter-in-place’ concept had never been tested, we got out,” said Sargenti.



Sheri and Steve Sargenti had no damage at their home in The Crosby. There are no wood surfaces on exteriors of homes in the housing areas.

The fire was coming their way that Monday, so they left with their two children, three dogs and a cat. When the reverse 911 call came in at 9 a.m. that Monday morning, “we were long gone,” Sargenti said. Where they stayed in Oceanside “got really bad smoke,” but no fire, he said.

“We said, if we’re going to get out, we’re going to leave early,” said Sheri Sargenti. The couple had been told that, if they couldn’t get out, they should stay home, that it would be the safest place to be.

Steve Sargenti said he “knew our house was intact,” and when the family returned, they found their house was untouched, other than smoke inside. Embers that landed on the concrete tile roof had burned out, and the courtyard in front of the house “was a repository” for spent embers, he said. Two plants in the backyard were damaged.

“It all worked,” Sargenti said. “We’re glad that they (the developer and fire department) had a very restrictive list of plants that are allowed (to be planted around houses in the developments). It was definitely worth it.” Limits and

restrictions, placed on both construction of their more than 3,600-square-foot two-story home and flora around it, “are an asset,” Sargenti said.

There is no exterior wood on the exterior of their house. There is no wooden deck in the back yard. There is a lot of slate and rock, grass and fire-resistant plants.

“Rancho Santa Fe has done some really, really pivotal work,” states Ron Coleman, former California state fire marshal.



The Witch Fire burned up to irrigated defensible space behind homes in The Crosby and stopped, leaving no damage to houses.

Considering that their home is worth about \$1 million, and that the cost is low to clear the house and garage of smoke and spent embers, there is a major benefit to the Sargenti’s in actual dollars. “All the mitigation done in advance of the wildfire is great,” Sargenti said.

That benefit extends multifold to all the houses in the five developments – some of the costliest homes in the nation, according to USA Today. Homes in the Bridges, for example, ranged in cost in 2007 from \$2.5 million to \$8 million or more, according to Ken Ayers,

development manager for the Bridges. Homes in other developments can range to as much as \$14 million each, real estate representatives for the developments said.

Veteran Firefighter Uses Mitigation to Protect His Home

San Diego County, California

Fallbrook, Calif. - As a veteran firefighter, Gary Bottenfield understands the nature of fires and knows how to be prepared. Bottenfield has lived in Fallbrook for 32 years with his wife, Lana, where they have survived three major fires.

On Monday, Oct. 22, 2007, a devastating wildfire started in Rice Canyon in the San Diego area. The Rice Fire burned 9,472 acres between Oct. 22 and Oct. 29, 2007, in and around the northwestern San Diego County unincorporated community of Fallbrook. More than 200 structures were damaged in this fire, according to CAL FIRE, the state fire agency.

As the Rice Fire made its way toward Interstate 15 and jumped across Pala Mesa Resort Golf Course, the Bottenfields knew their house was in great danger. They received the reverse 911 call on Monday afternoon and took shelter at their daughter's home in Temecula. Even though it was painful to leave their home, as law-abiding citizens they understood the importance of listening to the authorities and following mandatory evacuation orders.

When Bottenfield returned home on Wednesday afternoon, he found the house intact even though his next door neighbor's house and two other homes within view were completely gone. He later learned that once his neighbor realized his home was already a total loss, he worked relentlessly with the firefighters to keep the flames from getting any further.



Gary Bottenfield shows Mitigation specialists Rosane Walker and Maggie Tenorio where his neighbor's home used to be.



Photo shows the fire alarm, which is part of the security system. Mitigation measures shown are the concrete tile roof and boxed eaves.

When asked why he believed his house survived the Rice Fire, Bottenfield replied: “The fact that I mowed my weeds saved my house. One of my neighbors and I share a mower and we tear the blades up every year.” Said Bottenfield, “We make sure we always mow everything down to the dirt.”

Something as simple as mowing the weeds was a lifesaver for the Bottenfields; but that is not the only mitigation safety measure they have. Their 2,677-square-foot stucco home has a concrete tile roof, boxed stucco eaves, fire sprinklers inside the house and attic, smoke detectors in virtually every room, double-pane glass windows, and a carefully planned defensible space on the 2.7-acre home site.

Defensible space does not necessarily imply cutting down all trees and shrubs, or creating a bare ring of earth across the property, according to the general guidelines from the State Board of Forestry and Fire Protection and the California Department of Forestry and Fire Protection (CAL FIRE). A defensible space around a home provides firefighters with enough space to work and also prevents fire from transferring from one fuel source to another. It can be created by removing dead vegetation, separating fuels, and pruning lower limbs of trees. Bottenfield has done all those things in addition to planting red apple ice plants along the edges of his property, which is known for its fire retardant capabilities.



The Bottenfields back yard is designed to reduce fuel with spaced out vegetation and lower limbs of trees trimmed.

A retired firefighter, Bottenfield is a firm believer in smoke alarms: “I have seen smoke alarms save lives. They are the cheapest investment you can make, and you can never have too many.” said Bottenfield, “Sleeping with your bedroom door closed also could save your life; it will keep the smoke out and keep the fire from spreading too quickly.”

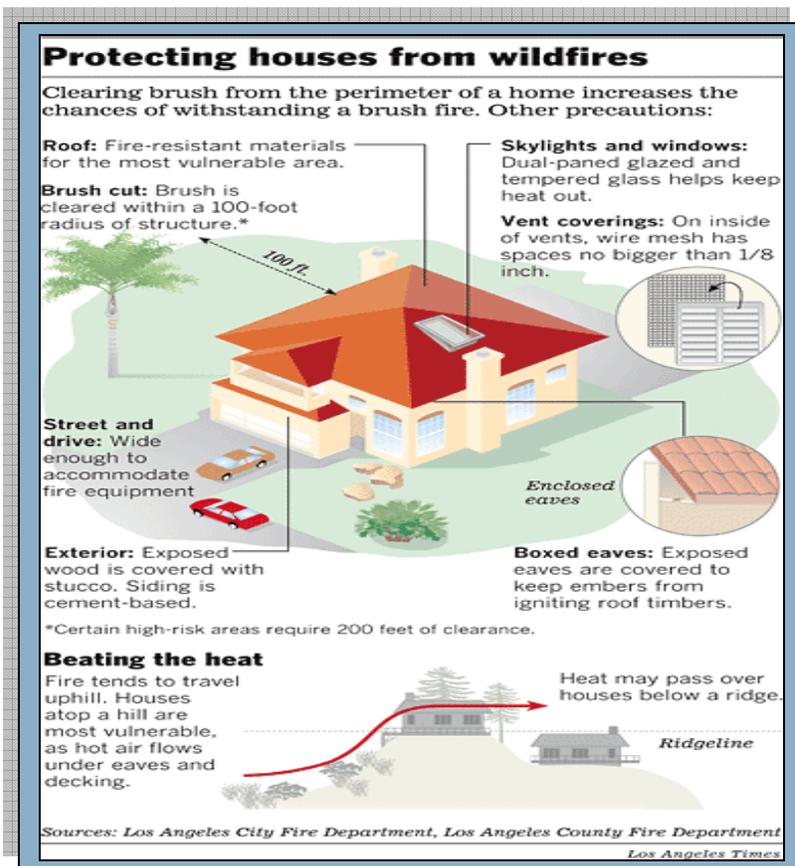
The Bottenfields said they learned a lot during the evacuation and will be more prepared next time. They were able to devise a plan based on their observations of what happened and how they reacted to the situation. Lana Bottenfield will focus on taking family photos and irreplaceable things while her husband will focus on important documents. Together they make a great team. They also keep a four month supply of canned goods and water in the house for emergencies.

“I have seen smoke alarms save lives. They are the cheapest investment you can make, and you can never have too many.”

The cost for using boxed stucco eaves instead of the regular wood ones that were in the original construction plans was approximately \$1,500 extra. The cost for having sprinklers installed inside the house was \$3,500. Money well-spent, according to Bottenfield. The replacement value of his home has almost doubled from the \$350,000 he spent years ago, so Bottenfield was happy to spend a little extra to make his home safer and stronger.



Gary Bottenfield stands in front of his stucco home with concrete tile roof, double pane windows, and fire resistant composite siding.



Graphic prepared by the Los Angeles County Fire Department and used to promote wildfire resistant construction.

Fuel Modification Protects Master-Planned Community

Orange County

Orange, Calif. – Devastating wildfires raged across Southern California in October 2007. One of the fires, known as the Santiago Fire, started in the Santiago Canyon the evening of Oct. 21 and burned 28,400 acres. It came extremely close to the master-planned community of Serrano Heights, in the city of Orange. Fortunately no homes were damaged in the community due to carefully designed fuel modification zones and fire-resistant construction of the houses.

The Santiago Fire destroyed 15 residential structures and nine outbuildings, and damaged eight residential structures and 12 outbuildings according to the California Department of Forestry and Fire Protection (CAL FIRE). Strong Santa Ana winds in conjunction with dry vegetation spread the fire over thousands of acres, making it extremely difficult for firefighters to contain it. It was the second wildfire to threaten Serrano Heights in the same year. The first, the Windy Ridge Fire, in March 2007, also came close but didn't damage any homes.

A master-planned community differs from a typical subdivision by the large number of amenities and vast land area that it incorporates. Before creating a plan, the developer works closely with the community to understand its needs and to create a place that will contribute to the area. Shopping, commercial centers, schools, places of worship and other amenities are often included in the plans. Because of the size of the community, there are usually several builders involved, offering a variety of house plans, which makes it less of a cookie-cutter neighborhood.



Firefighters use irrigated defensible space in Serrano Heights to fight Windy Ridge Fire. - Photo courtesy of Orange County Fire Authority

As a master-planned community, Serrano Heights involved much advance planning and ongoing coordination between private and government entities. Serrano Heights is located on a hillside and is divided into west side (Phase I) and east side (Phase II). The west side fuel modification area falls under the jurisdiction of the city of Orange and the east side falls within the jurisdictions of the cities of Orange and Anaheim.

“It is very important for city management, building department and the fire department to be on the same page early on” said Ian MacDonald, Deputy Fire Marshal for the City of Orange Fire Department. “Jurisdictions need to understand their community and have fuel modification plans ready, so they can work closely with developers to avoid future problems.”

In order to avoid a potentially difficult problem with power line easements and to comply with fuel modification requirements, the landowner, SunCal, worked closely with the city of Orange fire department, the county of Orange, and the city of Anaheim fire department during the planning process. The result was a creative solution to the power-line problem by creating a park and approximately 200 acres of preserved open space which benefits the residents.

Serrano Heights was built according to the City of Orange Fire Department stringent rules for fuel modification zones, fire officials said. The zones are wide strips of land where combustible

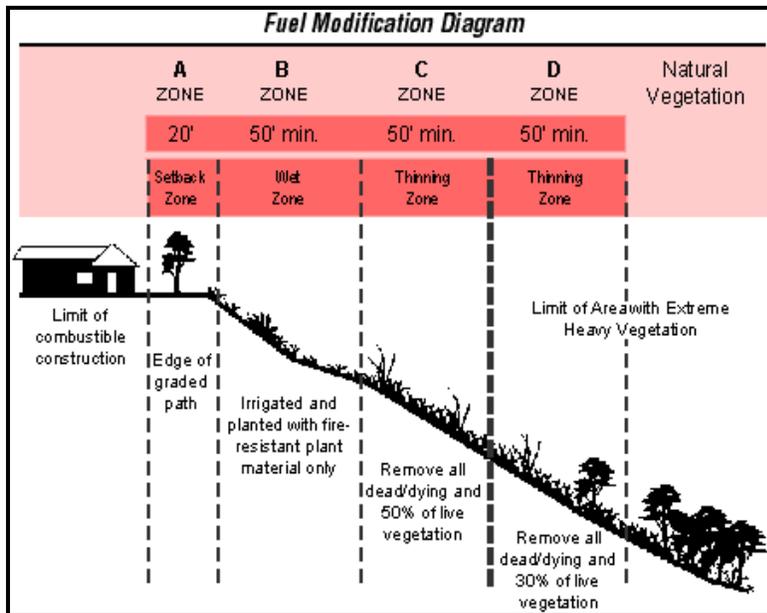


Diagram shows fuel modification zones – up to 170’ feet from home –
Graphic courtesy of Firewise Communities

vegetation has been removed and/or modified and replaced with drought-tolerant, fire-resistant plants to provide an acceptable level of risk from wildland and vegetation fires. A typical fuel modification installation consisted of a 20-foot setback zone (Zone A), a 50-foot minimum irrigated zone (Zone B), with an additional 100-foot minimum of vegetation thinning zones (Zones C and D). The minimum width of the fuel modification zone for Serrano Heights is 170 feet and in several areas the width increases due to the type of terrain and/or type and mass of vegetation, according to the Orange fire department.

The state’s new 100-foot Defensible Space Law, which went into effect after Serrano Heights was built, calls for a 30-foot cleared setback area with limits on plants immediately around each home in the wildland urban interface and the next 70-feet to be a fuel reduction zone with irrigated fire-resistant vegetation.

“With beauty comes the dangers,” said Patrick Murphy, one of the landscape architects who worked on the Serrano Heights project. “Fuel modification can be a real issue and how you address that is the key.”

A company was hired to prepare a fire behavior analysis and preliminary fuel modification plan for Serrano Heights. The plan included detailed studies regarding fire environment, Southern California climate, wildland fire behavior, local fire history, general and individual lot recommendations for fuel modification zones, and additional fire protection measures. The plan was reviewed and approved by the city of Orange and city of Anaheim fire departments. During implementation and construction, the fire departments of both cities carefully monitored each phase to ensure the requirements were met.

The requirements and guidelines for areas inside homeowners’ property lines are specified in the Covenant, Conditions and Restrictions (CC&Rs) and in the deed for each property. They are enforced by a management company and the Serrano Heights Homeowners Association (HOA).

The areas outside of the homeowners' property lines are maintained by the HOA. Twice a year the management company sends a letter to the city of Orange on behalf of the HOA stating that it is complying with the rules and, as needed, inspections are done.

“When it comes to master-planned communities, it is much easier for the Fire Department to deal with a homeowners association so there’s only one point of contact,” said MacDonald. “Serrano Heights HOA and the City of Orange Fire Department work very well together.”

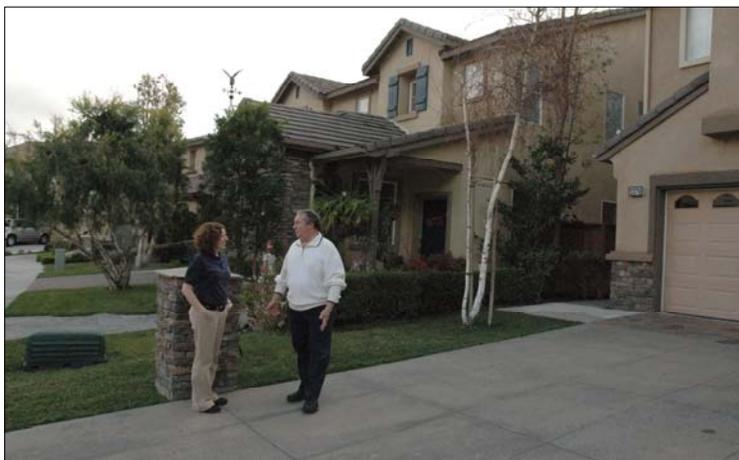
The defensible space created by the fuel modification areas was tested twice in 2007 and proved to be very effective against both fires. Javier Reyes, president of the company providing



Aerial view of the Serrano Heights Community shows the fuel modification area surrounding the development. Photo courtesy of SunCal Companies

landscaping for Serrano Heights since 2000, said, “Having the area clear and moisture on the ground definitely helped keep embers from causing fires. It proved that the irrigation system worked.”

“Serrano Heights does a very good job of maintaining their fuel modification area. A fuel modification plan is useless if there’s no proper maintenance,” said MacDonald. “It’s much cheaper to do the maintenance than to have to go back and do the work all over again to bring it up to standard.”

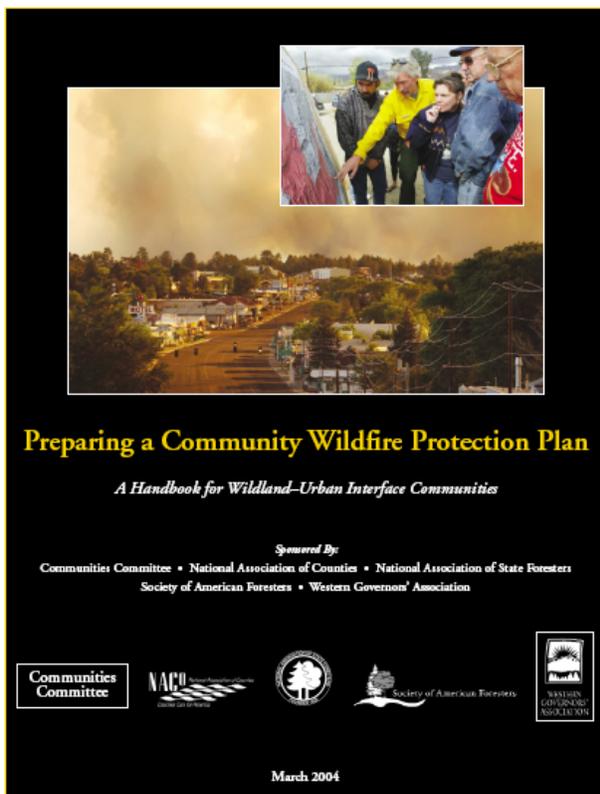


Don Gray, HOA president, speaks with FEMA Mitigation Specialist Rosane Walker about Serrano Heights. The homes shown in the photo have stucco exteriors and clay tile roofs.

All residences in the community were built to meet standards from the Uniform Building Code (UBC) and the Uniform Fire Code. These codes take into consideration multi-hazards including seismic activities. The houses were built with non-combustible materials on the exterior walls, cornices, eave overhangs, soffits, exterior balconies and fencing; class “A” roofing; attic and foundation ventilation covered with metal louvers and a ¼-inch mesh corrosion-resistant screen.

Serrano Heights, with its 998 homes, plays an important role in the community. If a fire were to reach the homes, it could have a huge socio-economic impact in the area. The residents, however, are confident that they are doing the best they can to prevent that.

“I don’t feel threatened,” said Don Gray, Serrano Heights HOA president, “I know there’s a risk of fires, but I’m not that concerned. The pre-planning was very well done for this community.”



This handbook offers guidance for any community towards developing a wildfire protection plan. The steps are practical and easy to follow. For an electronic copy, go to; www.safenet.org/policyandpress/cwpp.cfm

Laguna Beach Goat Vegetation Management Project

Orange County

Laguna Beach, Calif. – Laguna Beach has been using goats as part of its fuel reduction and vegetation management program since the early 1990s. City Manager Ken Frank got the idea from a similar program in the San Francisco Bay area. The program was expanded after a wildfire burned across 14,000 acres, destroying and/or damaging 441 homes in the beach community in 1993.



Goats grazing on Bluebird Canyon slope in Laguna Beach. They are able to “work” on steep slopes that are difficult for humans.



Photo shows area grazed by goats in Northern California, where the program was pioneered in the state of California.

Because of the climate, types of natural vegetation and expansive wildlands in Southern California, including wildlands that reach into the city, there is an ongoing risk of wildfires. Fully aware of the risk, the Laguna Beach Fire Department is very proactive in vegetation management.

One of the best ways to control wildfires is to control the amount of fuel available to feed the flames. These areas can be difficult to reach by most vegetation management equipment due to the nature of the terrain – rocks, canyons, and steep inclines. The introduction of goat herds in these areas has proven to be an ideal solution to the problem.

In Laguna Beach, goats play a significant role in reducing ground fuel loads, with a few hand crews used in certain places. “The goats are very effective,” said Ray Lardie, Fire Prevention officer who coordinates the program for the City. “They can go where people can’t.”

In 1995, Laguna Beach applied and received a grant from the FEMA Hazard Mitigation Grant Program (HMGP), which is administered by the Governor's Office of Emergency Services. FEMA’s grant was \$396,000 and the city’s share of costs for the expanded program was \$132,000. The FEMA grant funded the program for two years and the city has continued the effort ever since, at an annual cost of \$125,000.

The goats work exclusively on 11 fuel modification zones located on the outside edges of the city. Since California weather allows it, the goats work year-round and are moved from place-to-place as needed. Depending on the amount of rain and vegetation growth each year, as few as 75 and as many as 600 goats are used. A movable goat pen with electric fencing keeps the goats from wandering off and protects them from coyotes and other wild animals, said Lardie.

A number of states including Nevada and Utah use the same strategy to reduce fuels in their wildland urban interface areas. According to Utah State University, goats can be used for a variety of land management purposes such as reducing the incidence of wildfire, rangeland improvement, riparian and watershed management, improving wildlife habitat and reducing nutrient competition in tree plantations.

Fuel reduction by goat grazing is more widely accepted than chemical and mechanical alternatives because of its sustainability. An added benefit to the program is the cost, which can be considerably lower than other methods available.



Ray Lardie, fire prevention officer, explains details of the fuel modification program to FEMA mitigation specialist Michael Raphael while goats graze at Bluebird Canyon in Laguna Beach.



Goats feed on lower limbs and leaves of brush and trees, reducing risks of ground fuel spreading fires quickly.

Environmental concerns are taken into consideration before the program can be implemented in each fuel modification area. A county permit is obtained and botanists study the area, flagging endangered species. Environmentally sensitive plants are fenced off to protect them from the goats.

“It’s like a petting zoo around here. People bring their kids to see the goats all the time,” said Lardie, adding, “the majority of the community is very supportive of the program.”

Information from Fire Department Increased Awareness

San Diego County

Rancho Bernardo, Calif. - Bette Blankenship became familiar with defensible space and ways to mitigate her property from effects of wildfires through brochures her children brought home from school. The brochures came from San Diego's fire department, which was in the process of providing information about fire prevention and mitigation to students at schools in the Rancho Bernardo area. After she read the materials, Blankenship knew she had to take action, and did.

So, when the raging inferno known as the Witch Fire approached, she and her family were ready. At that, the blaze severely affected her neighborhood in October of 2007, leading Blankenship to say, "I can't believe that we did not lose our home and more homes on our street."

She is convinced that the type of materials used in upgrading her home, removal of trees and plants prone to burn and spread fire, and the expansive back yard that serves as defensible space, saved her home, while homes directly across the street were lost.



Bette Blankenship stands in her backyard near the deck that was destroyed by the October 2007 wildfire. That was by far the worst damage sustained at her home. Carefully planned defensible space helped save her home.

When Blankenship and her family moved to their home in 1998, the lower portion of their $\frac{3}{4}$ -acre property was covered with avocado and citrus trees. After learning about fuel modification, Blankenship and her husband, Gregg, started removing the hazardous trees from their back yard. The effort took three years at a cost of \$7,000. Bette started planting fire-resistant plants in 2002 before the Cedar Fire of 2003. Ice plant and other fire-resistant plants of a variety of species now cover their back yard.

The Witch Fire in October 2007, which devastated much of their neighborhood, started near Santa Ysabel and spread to Ramona, Rancho Bernardo, Poway and Escondido. Burning embers, driven by powerful winds generated by Santa Ana conditions, flew over Interstate 15, spawning fires west of the highway. The Witch Fire continued west, causing significant damage in Lake Hodges, Del Dios, West Rancho Bernardo and parts of Rancho Santa Fe.

Far and away the biggest of 24 wildland fires that burned in the seven-county disaster area in Southern California, the Witch Fire caused two deaths and injured 40 firefighters, according to Cal Fire, the state's fire agency.



Bette Blankenship, right, describes how her home survived the 2007 fire to Maggie Tenorio, mitigation specialist. Lots across the street from her home were cleared of debris and slabs so new houses could be built.



The Blankenship home in Rancho Bernardo has fire-resistant roofing material, stucco walls, double-pane glass windows, treatments on wood surfaces including fencing to make them fire-resistant, and enclosed eaves.

A total of 1,125 homes and 509 outbuildings were destroyed, another 77 homes and 25 outbuildings were damaged and, altogether, 197,990 acres were burned.

The Rancho Bernardo subdivision was heavily impacted by the Witch Fire. According to the City of San Diego, more than 300 homes were destroyed and damaged in the area.

The Blankenship home, constructed in 1978, has concrete roof tiles, stucco walls, enclosed eaves, double pane windows, and fences and wood on exteriors are treated with heat-resistant materials.

Although their home sustained little damage, the Blankenships continue to think about what they will do in the future, saying mitigation techniques will continue.

The next thing the family plans to do is replace other trees in front of the house with less flammable, more fire-resistant species.

Fully-mitigated University is Prepared for Disasters

Los Angeles County

Malibu, Calif. – When the Canyon Fire came roaring through Malibu Canyon in October 2007, Pepperdine University’s Malibu campus was ready. The sprawling 830-acre campus and its buildings are mitigated as much as possible against fire, so much so that administration, staff, and students can feel safe if they are not able to leave the school grounds when a wildland fire approaches.



The Pepperdine Campus has interior defensible space as well as irrigated fire-resistant vegetation around its perimeter.

Because of advanced planning, mitigation of structures and wide expanses of defensible space, effects of the fire in October 2007 were greatly reduced. Flying embers were the cause of problems on the Malibu campus. A small building that sits alone about one mile from the administration building caught fire and apparently was destroyed. Three vehicles, belonging to staff members, parked on a lot in front of the administration building, were set on fire by burning brush. Brush next to the main administration building burned but did not affect

the four-story structure.

The Canyon Fire burned 4,500 acres in Malibu Canyon. Six homes and a church were destroyed. It was the first of 24 wildfires that occurred in October 2007 in seven Southern California counties, and the first wildfire to receive significant media attention.

The fire, which raged onto the undeveloped university land in the early morning hours of Oct. 21, was turned back at the edges of the school’s sprawling defensible space, stopped by city, county and state firefighters aided by helicopters and fixed-wing aircraft.



An overview of the campus from the burned hillside to the east, showing the untouched water tank at the right and how the fire only went upslope to fire-resistant vegetation on defensible space and stopped.

Los Angeles County Fire Department personnel staged their fire operations on and around the Malibu campus while fighting the Canyon Fire. The university was used as a base for 500 fire fighters and provided a grassy area that helicopters used in the process of making air drops on the fire. The school provided water from its giant water tanks for use by firefighters.



Fire authorities use this building as an Emergency Operations Center during times of emergencies.

The university has developed detailed procedures for dealing with emergency incidents and has its own Emergency Operations Center (EOC) up and running during emergencies. Fire agencies consider the campus to be so safe that they set up an EOC for fire fighting operations in one of the campus buildings.

On the first day of the Canyon Fire, all faculty and students who were on campus were notified of the approach of the fire and were provided information through the

university's new emergency notification network about relocating from dorms and classrooms to designated shelters on campus.

Faculty, staff and students away from the campus as the fire approached were urged to not return by the Los Angeles County Fire Department. Pepperdine officials continued to provide status updates through the school's notification network to staff and students on campus about the fire throughout the day and also advised everyone that classes were going to be cancelled the next day. The alert system was rolled out with the start of the fall semester in 2007 and was tested successfully just ahead of the fire.

Student response to the alert system has been positive, with many commenting on how the system provided accurate information and cleared confusion, which can result in time of emergencies, administrators said.

All buildings on the 360 developed acres of the property are constructed to higher standards than are required by current Los Angeles County building codes. Facilities include the five schools, administration buildings, faculty apartments, student dormitories, and huge water storage tanks.

The Malibu campus has its own emergency generators, strategically placed water tanks (the biggest contains 3 million gallons of water), and a large supply of non-perishable food. Pepperdine University has the capability to feed and lodge 5,000 students, staff and administrators for as long as two weeks, administrators said.

All buildings are also structurally mitigated beyond what is required by code to resist effects of earthquakes, with structures built around steel members sunk deeply into the ground. Slopes are stabilized to reduce possibilities of mud and debris flows.

Pepperdine University's administration takes the position that they can always improve the campus' ability to successfully manage fires and other types of disasters. University administrators say they have always considered an all-hazards perspective and constantly search for new ways to make things even better.

"Pepperdine's success is attributed to its people," said Andrew Benton, chief executive officer for the university. The school's president and board of regents provide all the funding that is needed to institute changes and programs designed to protect people and facilities.



Areas where vegetation burned, including this area by the administration building, were cleaned up quickly after the fire, and sandbags were placed on slopes to prevent mud flows.

Administrators and staff have hunted through the FEMA Web site for information about mitigation "many times," said Benton. They have scrutinized such things as the Hurricane Katrina disaster, looking for "lessons learned," he said.

Officials at the university, which is located not far from the Pacific Ocean, also have to be aware of possibilities of how storm surges and tsunamis might affect the campus and how to deal with those events, administrators said.

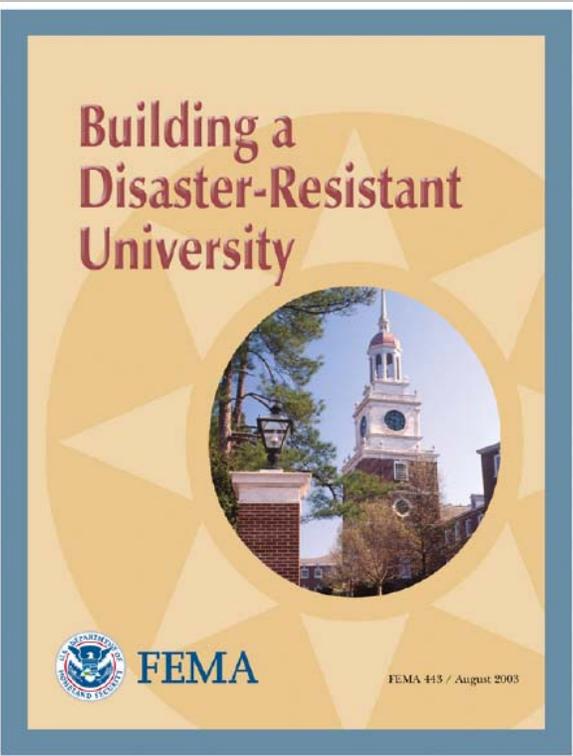
Not only are university administrators, faculty and staff working towards enhancing survival measures from earthquakes, high winds, wildfires, flooding and geological hazards, university personnel are trained in all aspects of emergency procedures and conduct exercises to test operations plans.



Defensible space with fire-resistant vegetation runs down slope from living quarters on campus.

Construction at the Malibu campus started in 1972. Several outbuildings and a pool shack burned during previous fires in 1985, 1993 and 1996.

The cost of building a safe campus is miniscule when compared to the costs of having to replace buildings that were not built to the highest possible standards.



The image shows the cover of a FEMA publication titled "Building a Disaster-Resistant University". The cover features a yellow background with a large, stylized sunburst pattern. In the center, there is a circular inset photograph of a university building with a prominent clock tower. The title "Building a Disaster-Resistant University" is written in a dark red, serif font at the top. At the bottom left, the FEMA logo is displayed, and the text "FEMA" is written in a bold, blue, sans-serif font. At the bottom right, the text "FEMA 443 / August 2003" is visible.

*This publication,
available from
FEMA, can be
ordered from
www.fema.gov*

Conclusion

Following the wildfires of 2003, the report *Wildfire Mitigation, Southern California Wildfires of 2003, Mitigation Success Report*, was produced by Region IX of the United States Department of Homeland Security's Federal Emergency Management Agency (FEMA). This report examined nine mitigation best practices and case studies of successes and lessons learned following the 2003 event and explored the question: Is it possible to prevent wildfires? The report found that while wildfire as a hazard cannot be absolutely prevented, the ability to reduce loss of life and property through mitigation is possible. This conclusion is again reached following the examination of the best practices documented after the 2007 wildfires.

The two firestorms, four years apart, occurred in the same month (October) and in the same counties (Los Angeles, San Diego, San Bernardino, Ventura and Riverside with the addition of Orange and Santa Barbara counties in 2007). In 2007, fuel conditions were similar to those of 2003, but the wind conditions were different: sustained winds of 60 mph with gusts recorded at 80 mph. In 2007, fire fighters were plagued by 23 fires burning simultaneously. Santa Ana winds picked up again in late November, 2007 and fanned the embers of a contained fire, creating the 24th wildfire of the season.

A comparison of the data of 2003 – 2007 shows a reduction of fire impact in all categories. Of course there are some variables in the data and many reasons for the reduction of the impacts. Fire behavior and location, fuel conditions, weather, encroachment into the wildland urban interface and fire suppression resources are just a few of the factors influencing the results. There are enough anecdotal reports from fire service personnel and homeowners that point to valid reasons why the data is encouraging.

Southern California Wildfires
1731-DR-CA
Fire Impact Data Breakdown Comparing 2003 – 2007

County	Acres Involved		Structures Lost		Fatalities	
	2003	2007	2003	2007	2003	2007
Los Angeles	19,096	109,102	0	139	0	0
Number of fires	2	7				
San Diego	384,509	369,662	3,241	2,565	16	10
Number of fires	4	7				
San Bernardino	150,729	14,331	1,199	450	6	0
Number of fires	2	4				
Ventura	172,195	35	308	0	0	0
Number of fires	2	1				
Riverside	12,718	682	87	3	0	0
Number of fires	2	3				
Orange	0	28,400	0	24	0	0
Number of fires	0	1				
Santa Barbara	0	710	0	0	0	0
Number of fires	0	1				
Totals	739,247	522,922	4,385	3,181	22	7

Source: ICS 209 Summaries, 1498-DR-CA-2003 - ICS 209 Summary, 1731-DR-CA-2007
CAL FIRE Statistics, Large Fires 2007, revised 12/2/2007

The Wildland Fire Lessons Learned Center (LLC), Tucson, Arizona, again sent out an Information Collection Team to interview responders to the 2007 fires. The team collected information from 103 respondents throughout the seven declared counties. The interviewees represented positions such as division chiefs, unit leaders, engine captains, incident management team members, fire fighters, public information officers and the state fire chief. The study aimed to learn from the event and also to capture how effective lessons learned from the 2003 fires were when implemented in 2007. The Team's *Initial Impressions Report, Southern California Fires 2007* reflects primarily response operational experience; however, the document includes several references to mitigation efforts that had been implemented and observed to be effective during actual fire fighting.

As reported by one Initial Attack Captain, his crew was able to save every structure because of the existence of 100' fuels reduction that had been done around the homes and the improved building construction. All of the structures were stucco. Another fire fighter stated that they had "bumped" into Fire Safe communities, and the reduced fuel loads in these communities often stopped the fire. In the report's discussion of fuel treatments, the following statement from a Strike Team Leader is quoted, "The best success was what homeowners did to protect themselves from fire."

"The best success was what homeowners did to protect themselves from fire."

Others commented on the effectiveness of hazardous fuel reduction programs, noting that fuel modification was critical to the number of homes that survived: 60 to 70 percent of the homes that survived had significant fuel reduction modifications; combination of enhanced building construction and "green belts". A \$100,000 fuel modification project done in the Grass Valley area, San Bernardino County, reportedly saved an estimated \$1 billion dollars in losses despite the 198 homes that burned in that area. Features that contributed to the successful defense of the undamaged homes included community protection zones, building codes and infrastructure developed for the inevitable fire the residents expected to happen sooner or later. The resulting cost saving is a prime example of the community working together with the San Bernardino Fire department and the Mountain Area Safety Team on the fire evacuation plans and creation of fire safe home sites and neighborhoods. Their combined efforts paid off and clearly demonstrated the value of people and agencies working together and participating to achieve a common goal.

In reviewing after-action reports from county fire services, one central theme emerged: the fires demonstrated unequivocally that defensible space around homes works. As we have seen in the best practices included in this report, defensible space or fuel reduction or fuel modification or vegetation management all have the same purpose and that is to reduce the fuel-load surrounding structures and building up on properties. While fuel-load reduction requirements may be instituted by government and fire prevention groups maintenance is the duty of the property owner. Communities benefit when property owners take responsibility to reduce fuel. New developments in urban and suburban areas as well as the more rural communities have become more proactive in the implementation and ongoing maintenance of their spaces. A fire-safe community begins with individual homeowners creating defensible space around their homes.

Fuel reduction alone is not the answer. As one fire chief has been quoted in saying, "A systems approach to wildfire mitigation is needed." This approach incorporates all elements that have

been demonstrated as successful wildfire mitigation. We know from fire service reports that homes that had been cleared and were built with fire-resistant roofs and siding still burned and

were lost due to flying embers that were swept up into attics through open eaves and vents. The old adage, “one thing leads to another” is applicable when dissecting the causes of ignition. Newer communities, such as the Rancho Santa Fe development in San Diego County and Serrano Heights master planned community in Orange County, are incorporating the systems approach in their design. The success of these efforts relies upon exceeding the basic requirements of fire-resistant building materials and fire-resistant landscaping. The working partnership between the developers, homeowners, fire service and ultimately the home owners association is what establishes the foundation and the continuity needed for risk reduction.



Rancho Santa Fe Fire Marshall Cliff Hunter (center) does final house inspection at one of the Rancho Santa Fe new “Shelter-in-Place” fire resistant homes.



Jeff Lutz, Fire Marshal, Anaheim Fire Department and Tom Gorseclose, Division Chief, Orange Fire Department are briefed on the Serrano Heights fuel modification plans.

As always, the cost of any mitigation strategy becomes an issue. Whether new construction, existing construction, re-building, urban or mountain, the cost of compliance with building codes and requirements for defensible space must be considered. Mitigation strategies are included in new developments resulting in the costs being incorporated in the price of the homes. Re-building to new codes following a wildfire or any disaster are often viewed as cost prohibitive to the homeowner. To some extent, this might be true; however, when comparing the losses that may be incurred without the protection of mitigation measures, the probable one time cost of fire-resistant construction and landscaping becomes more tolerable. One of the tragedies of both the 2003 and 2007 fires was the discovery that many homes lost were underinsured.

Homeowners have choices. Living in an area that is known as vulnerable to frequent wildfires is one choice. Becoming educated to the risk and taking action to reduce that risk is another choice. As documented in the best practices of both 2003 and 2007, several commonalities emerge as mitigation successes. Defensible space, fire-resistant construction and landscaping, enforcement of building codes, public education and partnerships continue to lead the way toward reducing vulnerability and losses due to wildfires.

Wildfire Awareness Web Sites

Federal Emergency Management Agency

<http://www.fema.gov/>

California Office of Emergency Services

www.oes.ca.gov

Southern California Wildfire Hazard Center

http://research.aero.org/SoCalWHC.fire_danger.html

California Department of Forestry and Fire Prevention

www.fire.ca.gov

California Department of Insurance

<http://www.insurance.ca.gov/docs/FS-SCW.htm>

USDA forest Service, California Region

<http://www.fs.fed.us/>

Natural Resources Conservation Service

www.nrcs.usda.gov/

California Code of Regulations (CCR)

Title 24, Part 2, Building Code

<http://www.dsa.dgs.ca.gov/Code/title24.htm>

California Code of Regulations (CCR)

Title 24, Part 9, Fire Code

<http://www.dsa.dgs.ca.gov/Code/title24.htm>

Bureau of Land Management

<http://www.blm.gov/>

California State Land Department; Fire Mgmt Division

<http://www.castatefire.org/index.html>

National Interagency Fire Center (NIFC)

<http://www.nfic.gov/>

National Wildland/Urban Interface Fire Program

www.firewise.org

Multi-Agency Coordination

<http://geomac.usgs.gov/>

Smokey Bear

<http://www.smokeybear.com/>

Wildland Fire Lessons Learned Center

<http://wildfirelessons.net/>

Preparing a Community Wildfire Protection Plan

<http://www.safnet.org/policyandpress/cwpphandbook.cfm>