EXECUTIVE SUMMARY
The last six years have brought a spate of catastrophic wildland/urban interface fires to California. Results garnered during in-depth reviews of these incidents may surprise you. The reviews also point out some flaws in the way vegetation and construction management are practiced.

California's Catastrophic Intermix Fires

Causes, Culprits and Cures

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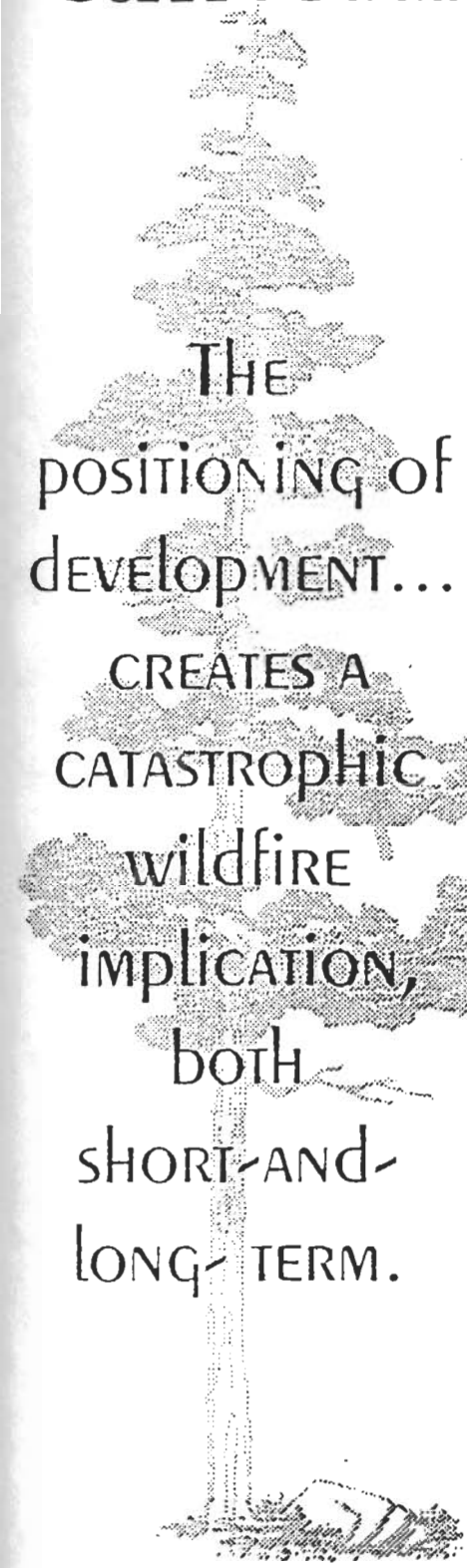

FIVE HISTORIC FIRES

Catastrophic wildland/urban interface fire monitoring in California since 1990 has produced several fascinating inferences and a number of significant conclusions. Five fires were reviewed, beginning in June 1990 with the College fire in Glendale, CA and the Paint fire in Santa Barbara/Goleta, CA. The next year, the East Bay fire occurred; and 1993 included the Laguna fire in Orange County and the firestorms in Old Topanga and Altadena in Los Angeles County.

Both the Paint fire and College fire occurred on the same day, causing the loss of over 600 structures at the Paint fire and over 60 at the College fire.

After reviewing fire videos and making on-site inspections of these incidents, some startling consistency was observed (CDF & FP 1994; FEMA 1993). In both the Goleta and Glendale conflagrations, the fire was carried from structure to structure via ornamental vegetation. Radiated heat provided some impetus; however, ornamental shrubs provided the wick.

While wood roofing and siding acted as a receptacle, the primary fire carrier or flame front was ornamental vegetation. At the College fire, the first two structures lost had non-combustible roofing and stucco walls. The fire entered via open doors—brought to the structures by burning ornamental vegetation.

At the Paint fire, Sundowner winds associated with a subtropical, high-aloft weather situation created winds in excess of 60 mph and air temperature of 100 degrees F. The temperature at the College fire was in excess of 100 degrees F., with winds less than 30 mph. Fine fuel moisture was less than 2 percent, and live fuel moisture in chamise was below 70 percent at both Glendale and Goleta.

The Paint fire originated within the Los Padres National Forest south of the summit of San Marcos Pass. It moved downslope into the urban interface of Goleta. Spotting in excess of one mile was observed.

The College fire was ignited in grass, then spread upslope through sage and ornamental shrubs. From there, it entered the first structure, then moved to the second through cypress and juniper.

FACTS & FALLACIES ABOUT FIRE CAUSE

Ornamental vegetation (cultivated biomass) involved in both the Paint and College fires was remarkably similar. Acacia, cypress, eucalyptus, juniper, pine and palm formed the exotic palette adjacent to structures in both instances.

High- altitude infra-red imagery from NASA-Ames depicted severe drought stress over the Goleta / Santa Barbara front area. Ornamental vegetation was stressed by two years of severe water rationing, also depicted in the NASA photos. California had experienced drought conditions dating to 1985.

Surprisingly, several structures survived both fires, despite their location in areas that were completely decimated. Why?

At first look, it appeared that wood roofing was the culprit. A closer view revealed that the surviving structures had smaller amounts of proximal ornamental vegetation. In addition, 99.5 percent of the structures that were lost were built prior to 1980.

From this data, a wildfire MO—*modus operandi*—was established. It was established that fuel breaks of 100 feet made little difference if ornamental shrubs were exotics and not maintained. Secondly, ornamental shrubbery took on the same characteristics as wildland fuel if in excess of five years had elapsed since it was last landscaped (Franklin, 1990).

Finally, structures built after 1980 were tighter and more energy-efficient. They generally had double-pane windows, boxed eaves and, of course, no wood roofs.

The 1991 East Bay fire in Oakland's Berkeley Hills consumed over 3,700 structures. Twenty-five people died as a direct result of that conflagration.

Harold Bisswell, professor emeritus at U.C. Berkeley, predicted this fire in a conversation back in 1981. During the fire, high—20-to-25 mph—winds drove the fire from a park area into the urban interface, carried primarily by ornamental exotic vegetation.

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Initially, it appeared that radiated heat from torching structures created the problem. However, a close video view shows the flaming front moving well ahead of the torching structures. In reality, the structures were the aftermath or product of the fast-moving fire front. Planted vegetation was the wick.

Structures built before 1980 were consumed, except for recently landscaped and upgraded units. Fire personnel blamed wood roofing as the carrier, but a careful analysis of video footage displays ornamental biomass as the primary flame propagator, with wood roofing a contributor.

Ornamental biomass was stressed, with a high dead-to-live ratio created by the six-year drought that stretched from the mid 1980s into the '90s.

Robert Burgan of USDA-Forest Service-PNW tracked drought stress in the area using advanced very high resolution radiometer (AVHRR) data from TIROS-N weather satellites (Burgan, R. 1993). Wildfires erupted throughout Southern California in late October and early November of 1993, the Santa Ana wind season.

The Laguna Fire spread through coastal sage scrub directly into the ornamental vegetation that surrounded the structures of that that beach community. Again, over 99 percent of structures lost were built before 1980.

The Altadena fire burned primarily in *C.megacarpus* and *Adistoma fasciculatum* that was about 25 years old. *C.megacarpus* was afflicted with leaf dieback. Structures lost in that community were all pre-1980.

In Old Topanga Canyon, the fire spread from coastal sage scrub into hard chaparral with leaf dieback. It literally exploded into old growth chaparral that had not burned since the 1940s. The fire traveled to structures in Malibu, again using ornamental vegetation as the wick to flash from wildland to urban.

The Old Topanga fire emphatically verified some data garnered from the previously discussed fires. Specifically, there was a mix of structures built prior to 1980 and structures built post-1980. Ninety-nine percent of the structures built after 1980 survived. The *loss* figure for structures built pre-1980 was 99.5 percent.

The anomaly among pre-1980 construction was surviving structures mainly in the Big Rock Mesa, the La Costa and Malibu Creek areas, where limited ornamental vegetation management was practiced. For example, in Big Rock, a wood-shingled, wood-sided structure survived because the surrounding ornamental vegetation was managed, while structures less than 100 feet away—despite having non-

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combustible roofing—were consumed.

OLD PROBLEMS & NEW APPROACHES

Several planners have advocated cessation of all building in the wildland/urban interface area (Fulton W. 1995). Implementing such a draconian measure would create a whole host of issues, not the least of which is the debate over "taking" property.

Unfortunately, the cessationists have failed to analyze what is burning. The real wildfire and environmental problem at present is associated with pre-1980 infrastructure, construction and landscaping (L.A. County Wildfire Safety Panel, 1994).

These homes are characterized by:

- Little or no energy conservation measures. They have single-pane windows, inadequate insulation and loose overall general construction with wood roofing, siding and small timber decking with less than one-hour fire protection
- Exotic ornamental vegetation that is shallow-rooted and water-dependent. This is primarily comprised of conifer, juniper, cypress, eucalyptus, acacia and palm
- Over time (five-plus years), a significant buildup of dead biomass in aerial array
- Little or no community cooperation in landscape maintenance.
- Old, inadequate water systems
- Narrow, less than 25-foot road widths

The positioning of development, with the influence of exotic grasses, shrubs and trees creates a catastrophic wildfire implication, both short- and long-term. Recent literature (Fremontia, October '95) has raised serious discussion regarding the invasive nature of exotic or non-native grasses into the coastal sage scrub community. Long-term effects of this include loss of habitat and increased fire regimes, resulting in further degradation of the coastal scrub population, according to Dr. R. Minnich of U.C. Riverside.

Specifically identified wildfire problems found in pre-1980 development include the spread of exotics into the hard chaparral community due to perturbations created from the development.

A significant number of landscape architects are presently advocating the use of exotics with irrigation, in hopes of aiding fire control. Unfortunately, as we have said before, during drought periods, homeowners must choose between bathing and watering their shrubs. Bathing wins out every time, leaving a drought-impacted, fire-prone vegetation nightmare.

One Santa Monica mountain community was found to be practically devoid of native shrubs both within and around its perimeter. Pre-fire-suppression maintenance performed on an annual basis had created an extremely flashy fuel (wick) through repeated disking and blading of the soil.

A similar condition presently exists in the coastal community of Laguna Beach. Here, quadrupeds (goats) are employed to provide a several-hundred-foot-wide fuelbreak in coastal sage scrub. The City of Laguna has pegged the cost of quadruped management at $650 per acre.

The fuel break is decimating the coastal sage while providing little or no protection to the community. In fact, perturbation caused by the goats is providing a flammable wick to the urban area. Modeling the 1993 fire in that area clearly displays the flames moving through and over the quadruped area and directly into the community, where little ornamental biomass management is practiced.

One group living in an area decimated during the 1993 fire plans to use high-fuel-moisture types of California native vegetation and chipped biomass as a longterm solution. A second faction, residing in an area that did not burn in 1993 but is obviously very vulnerable, is planning a significant fuel reduction program in existing ornamental biomass.

Both groups are employing techniques that will reduce annual maintenance, but, just as importantly, they are developing techniques that will sustain the coastal sage scrub plant community while providing significant wildfire protection.

In September 1995, the Los Angeles County Fire Department introduced the first really comprehensive wildfire ordinance adopted in the United States within the past 25 years. The new Fuel Modification Plan requirements are based upon recommendations of the "Wildfire Safety Panel" formed by the governing body of Los Angeles County following the catastrophic wildfires of November 1993.

Members of that panel included representation from the building industry, native plant proponents, city agencies—including Los Angeles City Fire Department—California Department of Forestry and Fire Protection, U.S. Forest Service, landscape architects, foresters, private wildfire consultants and regional planning officers.

Their analysis of the Goleta, Oakland, Laguna and Old Topanga Firestorm fires played a major role in formulating the new policy. They assessed what burned, how it burned and the environmental consequences.

The resulting plan does not specifically require 100 or 200 feet of

clearance. Instead, clearance is based upon vegetation, topography, exposure, structure design and weather.

Approved tree and shrub lists feature plants that are environmentally friendly. Native shrubs are highlighted because of both fire and drought resistance. The use of mulch or chipped biomass is encouraged to stabilize slopes, reduce annual maintenance and retain moisture while reducing green biomass impacts on landfills.

Recent legislative changes in the California Resources code require that green biomass sent to landfills be reduced by 25 percent in 1995 and 50 percent by 2000. Coincidentally, federal agencies both within and outside of California are adopting similar mulch or chipped biomass programs.

Designing a wildfire-safe community utilizing forest mulch, and native fire-resistive shrubs and trees, coupled with appropriate vegetation management practices, including limited irrigation, can both meet fire safety requirements and provide a more-compatible environment with the surrounding native plant community. Proper management can produce or replicate a "fringe" effect, enhancing wildlife cover as part of a fuel modification zone.

CONCLUSION

Massive firefighting initial attack resource commitments—including aerial delivery systems—were available within minutes of ignition during the '93 firestorms in Southern California, thanks to demobilization from other local fires. This massive force was the largest commitment of fire resources in California's history. Resource costs for catastrophic wildfires of this magnitude can exceed $1 million per 24-hour period (Franklin, S. 1994).

The continuing loss of pre-1980 structures from wildfires requires immediate attention. Under past fire prevention practices, communities continue to be at risk. A strong case can be made for vegetation management involving primarily native plants. This appears to be a more reasonable, environmentally sound, cost-effective approach.

Continuing research assessing post-1990 wildland /urban interface development relative to native shrub and tree species, wildlife atavism patterns and catastrophic wildfire survival would seem to be most appropriate.

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