

Urban-Wildland Fire Defense Strategy, Precision Prescribed Fire: The Los Angeles County Approach¹

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Abstract: In the County of Los Angeles, critical conditions at the urban-wildland interface range from concentrated development to dispersed development; elevations from sea level to 5000 feet with diverse ecosystems characterized by coastal sage scrub, Chamise, sumac, Ceanothus, Toyon, oak woodlands, pine forests, and desert sage; air quality impacts; sediment production; public education; and resource allocation.

The County of Los Angeles Fire Department has implemented a strategy to manage chaparral at the urban-wildland interface. The strategy encompasses historic wildfire frequency history and Santa Ana wind corridors coupled with scientific validation. Key to implementing this program has been the establishment of a Coordinated Resource Management Program.

Research requirements for the program are being addressed cooperatively by the Pacific Southwest Forest and Range Experiment Station, Forest Service, at Riverside, California. Participants in the "umbrella" agreement also include Angeles National Forest, Los Angeles City Fire Department of Public Works (Flood Control), National Park Service, and the

California Department of Parks and Recreation. Of particular significance is the ongoing scientific research associated with the urban-wildland management strategy.

The Los Angeles County Vegetation Management Program evolved after the 1978 disastrous Kanan Fire. That fire consumed 25,000 acres in 3 hours traveling from the Ventura Freeway (Highway 101) to the Pacific Ocean, about 10 linear miles. Over 300 structures were lost.

The fire, pushed by 60 gusting to 80 plus miles per hour Santa Ana winds, burned through fuels that averaged over 20 tons per acre. During high intensity runs of the fire, over 100 acres per minute were consumed representing an energy release s that approximated the Hiroshima nuclear event.³

Recognizing that energy releases of this magnitude are impossible to combat with conventional wildfire suppression resources, the Los Angeles County Fire Chief impaneled an interdisciplinary task force to address this problem. The task identified the following:

1. Historic wildfire corridors using fire history maps dating to 1919.
2. Santa Ana wind corridors. These are areas where Santa Ana winds surface and impact communities down wind.

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³Data on file, County of Los Angeles Fire Department.

3. Communities that are vulnerable to wildfire based upon fire history, Santa Ana winds, and fuel loading.

4. Areas that were experiencing development that in the future would be impacted by the above conditions.

5. Specific watersheds that, if burned under wildfire conditions, would pose a high sediment production capability.³

In the interim, between 1978 and 1980, the California Department of Forestry was seeking legislation to authorize burning on private lands and, most importantly, addressing the liability and environmental problems associated with a Vegetation Management Program.

The rash of wildfires in fall 1980, particularly the Panorama and Stable Fires, expedited this legislation. In 1981, SB 1704⁴ became law providing the liability and environmental solutions to implement a program in State Responsibility Areas (SRA). There quickly followed a Statewide Coordinated Resource Agreement to allow cooperating agencies to burn on Federal lands as SB 1704 specifically precluded using State funds on Federal lands without quid pro quo on the part of the Federal agency involved (Resources Agency 1981).³

In 1984, the Los Angeles County supervisors unanimously passed a resolution creating the Los Angeles County Coordinated Resource Management Program (CRMP). The resolution named John W. Englund, Forester and Fire Warden and Fire Chief, "Lead Agent" for resource programs in Los Angeles County, in addition this resolution set the stage for all governmental agencies in Los Angeles County to cooperate in programs within their annual budget capabilities that are mutually beneficial and in some cases, exclusive to their individual interests.

Within the first year of the passage of the Coordinated Resource Agreement, the following agencies became participants: Angeles National Forest, Pacific Southwest Forest and Range Experiment Station, Forest Service, U.S. Department of Agriculture; Los Angeles City Fire Department; Los Angeles County Department of Public Works; Los Angeles County Department of Parks and Recreation; Los Angeles City Department of Water and Power; National Park Service; U.S. Department of the Interior; Santa Monica Mountains Recreation Area; California

Department of Parks; and California Department of Forestry and Fire.

The Los Angeles County Coordinated Resource Management Program (CRMP) has two unique components:³

1. The umbrella concept with provision for specific projects to be executed cooperatively through a simple work plan that spells out the benefits and responsibilities of each participant.
2. Research requirements addressed cooperatively through the Pacific Southwest Forest and Range Experiment Station and the University of California at Los Angeles. Specific scientific research is producing a product that addresses native shrub regeneration, fire effects, models for wildland-urban fuels and fuels structure, smoke management and air quality chemistry, and post fire impacts of flood/sediment and debris flows.

Since the Los Angeles County program is designed to mitigate the effects of heavy fuel loads adjacent to concentrated and dispersed development or literally to "burn under the eaves," precise fuels and weather information is mandatory.

The Forestry Division within the Prevention and Conservation Bureau of the Los Angeles County Fire Department has instituted a fuels moisture monitoring program, on a 2-week basis, year-round, that tracks live fuel moisture in the following shrubs: Ceanothus, Chamise, and sage. This information is shared with cooperating agencies.

In addition, before and during a prescribed burn project, pilot weather balloons are launched and tracked with a Theodolite. This information allows the fire manager to provide a precise burning prescription. The pilot balloon data is also shared with the South Coast Air Quality Management District to update that agency's local hourly wind flow charts.

Phil Riggan of the Pacific Southwest Forest and Range Experiment Station. in conjunction with Jim Brass of NASA-Ames Research Center is investigating the shrub leaf moisture content with infrared imagery. In 1985, two areas in the Santa Monica Mountains were impacted by wildfire that was diagnosed earlier in the year with low reflectance in the infrared bands.

The preliminary research indicates that there is a relationship between leaf moisture content and infrared reflectance values regardless of age class of chaparral. This could prove to be an outstanding management tool, particularly in stands of mixed chaparral.

As a result of the Lodi Coordinated Resource Project, whose participants include the Pacific Southwest Forest and Range Experiment Station, Angeles National Forest, California Department of Forestry, and the County of Los Angeles Fire Department, preliminary data suggest that pollutants accumulated during decades of chronic exposure to urban emissions may be carried aloft during chaparral fires near the Los Angeles basin. Nitrogen and sulfur oxides in smoke from the experimental fire were as much as 300 times more concentrated than had been measured elsewhere according to Lawrence Radke of the University of Washington.

Wildfires frequently burn under the most adverse weather conditions including serious air pollution episodes. Where smoke is trapped near the ground, it may aggravate unhealthy air quality. Major wildfires may also inject nitrogen and sulfur oxides to heights in the atmosphere where they can be carried long distance, possibly contributing to acid rain in sensitive western ecosystems. This demonstrates the need for continued activity to break up large expanses of chaparral through the use of small, incremental prescribed burns, particularly in sensitive areas where chaparral and residential development are intermixed.

In comparison with major wildfires, lower intensity prescribed fires should volatilize less nitrogen or sulfur from soils and woody fuels and oxidize less atmospheric nitrogen to nitrous oxide. Further research is needed to better quantify emissions that may affect human health including the roles in smoke chemistry of accumulated pollutants and fire intensity.

Over the years, volumes have been written by research scientists, fire insurance specialists, engineers, and urban planning practitioners regarding urban encroachment into the wildlands.

Until the mid 1980's, all agreed that structure survival could only be accomplished through the following methods:

1. Structural Components
 - A. Fire-retardant construction (roofs, eaves, etc.)
 - B. Structure location (top of ridges, etc.)
2. Vegetation Conversion Component
 - A. Total vegetation removal for 200 - 400 feet from structures
 - B. Green belts, involving removal of native shrubs and substituting irrigated shrubs

In both the structural component and the vegetation component, fire officials have met with stiff resistance from both development and environmental interests. While some of the structural components have been accomplished, i.e., fire retardant roofs, little has been accomplished regarding structure location.

High altitude infrared imagery and on-site inspection show that green belts or cultivated biomass, after several years, appears to take on the characteristics of the adjacent native vegetation, i.e., significant amounts of dead fuel, and thus enhances the conflagration hazard particularly under severe fire weather conditions. Dealing with cultivated biomass poses a new problem in fire defense planning and will require considerable education from fire agencies and cooperation on the part of residents.³

Recognizing the impact of these diverse interests, the Los Angeles County Fire Department, under its charter function as the Department of Forester and Fire Warden, annually sponsors a symposium that affords an opportunity for research scientists, operational managers, and the public to exchange information on problems associated with managing chaparral fuels at the urban-wildland interface.

Since 1983, over 15,000 acres in 30 projects have been treated through the use of prescribed fire ranging from the communities of Castatic and Newhall in the North County, Bonelli Regional Park in the East County, Baldwin Hills in the South County, and Bel Air and Topanga Canyon in the West County.

In the interim, eight major wildfires have swept through areas that were under planning for the use of prescribed fire, thus validating the planning system. Four completed prescribed burn projects were instrumental in checking or stopping wildfires.³

Communities as diverse as Bel Air, Malibu, Topanga Canyon, Placerita Canyon, La Canada, Flintridge, and Castaic have requested prescription burn projects in their areas to mitigate the wildland hazard.

Recognizing the strong public support for the program, the Forester and Fire Warden and Fire Chief have, within the existing operational annual budget, instituted the following:

1. Within the Operations Bureau established the position of Vegetation Management Coordinator/Fire Defense Planner to oversee fuels reduction projects.
2. Established a fuels and weather monitoring unit within the Prevention and Conservation Bureau, Forestry Division. This is the only unit of its kind in the State of California.

3. Established within the Services Bureau a nationally recognized program for aerial ignition using fire helicopters, fire suppression camp personnel, and heavy equipment for implementing the projects.
4. Established within the Administrative Bureau, a Vegetation Management Training Program in cooperation with State and Federal agencies and actively recovered available federal, state, and local funds for the program.

Urban wildland fire defense planning, in Los Angeles County, under the direction of Fire Chief John W. Englund, has become a management program that reflects support from the fire service, the public, and scientific community.