FIRE AND CHAPARRAL MANAGEMENT AT THE CHAPARRAL/URBAN INTERFACE

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The historic Bel Air fire of 1961 was not unusually large or fast-moving, nor was it a disaster for the native chaparral ecosystem. Yet it was disastrous for residents of the area, a consequence of unrestricted urban development in the chaparral of Southern California. Its costs included human suffering and financial loss from the destruction of 484 of 2,300 homes.

Since that time fire-fighting techniques have improved and ordinances have been enacted to increase clearance around structures and to encourage the use of non-flammable roofing materials. Yet within the original fire perimeter there are now 3,500 structures of average value greater than $1.3 million, and the chaparral has flourished to the point where it can spread a destructive fire once more. Another disaster is in the making.

Chaparral is adapted to recurrent fire, and burning, in fact, is the only way to reduce heavy fuels without altering the community composition. Yet urban areas continue to expand into the chaparral and become more finely subdivided and vulnerable to fire. Moreover, the remaining chaparral is an aesthetic and biological resource for wildlife. Is there not a way to break the pattern of fires so destructive to humans without forever altering the remaining ecosystem? We believe that prescribed burning, together with other hazard-reduction measures, will ameliorate the problem.

In Southern California the wildland/urban interface problem is most critical in the Santa Monica Mountains where Santa Ana winds, following a natural corridor out of Newhall Pass, can push a fire across the mountains to the coast within a few hours. All too often, homes have been built both along ridgelines and in adjacent canyons with steep intervening hillsides. Poor vegetation clearance, flammable roofs, and restricted access place many structures at serious risk. During the Bel Air fire over one-half of the houses with wood roofs and less than ten feet of brush clearance were destroyed; less than one percent with approved fire-resistant roofs and clearance of one hundred feet were lost.

There are islands of chaparral isolated by development that cannot be readily managed and will contribute to destructive fires in the size range of five to fifty acres. But expanses of chaparral ranging from a few hundred to thousands of acres have the potential for producing conflagrations that can spread into urban neighborhoods. Beverly Hills, Bel Air, Brentwood, and Pacific Palisades continue to be imperiled by the spread of major wildfires in the Santa Monica Mountains. Some adjacent canyons are covered by chaparral with no historical records of fire and major build-ups of fuel that could generate disastrous fires.

Although much can be done to improve the fire safety of structures, to do so without reducing other risks is to accept that large fires will continue unabated. Actions can be taken to significantly reduce their threat. Over the past decade the application of prescribed fire has matured in the national forests and on lands under state responsibility in California. We feel that, despite the inherent risks, the time has come to apply managed fires to critical lands at the wildland/urban interface.

The value of prescribed burning is that frequent fires maintain chaparral with a relatively low biomass and a small proportion of dead wood. Young chaparral, especially ceanothus, is often incapable of spreading fire under moderate weather or high live-fuel moisture. With high winds and low humidity, young stands burn with reduced flame lengths and tend not to "spot," that is, spread by air transport of glowing fire brands. Lateral spread of large fires and their resistance to control are reduced, and soil heating damage and subsequent post-fire flooding and debris production should be lessened. Wildfires will not be eliminated by prescribed burning, but the impact of large fires should be drastically reduced if young chaparral is maintained in a shifting mosaic of age classes. Not all land need be treated as long as significant portions, and especially key terrain or fire corridors, are managed.

Altering wildfire regimes by age-class management, which is designed to maintain the native vegetation, is ecologically more sound than any widespread replacement by grasses or other low-biomass plantings. Such vegetation-type conversions frequently fail and reduce an otherwise complex ecosystem to fields of black mustard or buckwheat.

The Stone Canyon research and development project was organized to avert a replay of the 1961 Bel Air fire while preserving scenic quality, wildlife habitat, slope stability, and water quality. Prescribed fire is being introduced to the canyon as the primary method of fuel reduction. Participating in this interagency effort are the County of Los Angeles Fire Department, the City of Los Angeles Fire Department and Department of Water and Power, and the USDA Forest Service Pacific Southwest Forest and Range Experiment Station. A series of

meetings with local homeowners have involved the public in planning and generated strong local support.

The 600-acre Stone Canyon, in the city of Los Angeles, is the site of major storage reservoirs operated by the Department of Water and Power. It is bounded by Mulholland Drive and Sherman Oaks on the north and the community of Bel Air on the south. Homes line the perimeter, overlooking the canyon on the west and northeast. The proximity of structures demands extraordinary measures for fire containment and detailed knowledge of the vegetation and fuels so prescriptions can be tailored to specific sites. Research was initiated to map vegetation, monitor fuel treatments, and predict long-range ecological effects of management.

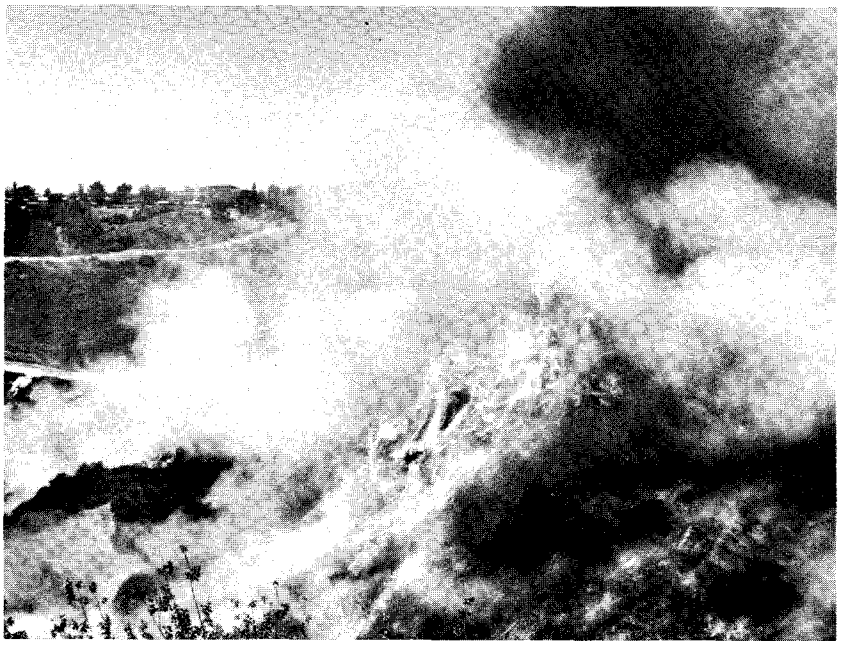
The native vegetation at Stone Canyon forms an ecotone between coastal chaparral, dominated by *Ceanothus spinosus, C. megacarpus, Rhus laurina,* and *Heteromeles arbutifolia,* and coastal sage scrub with *Artemisia californica, Eriogonum fasciculatum,* and *Saliva mellifera.* Small stands of *Quercus agrifolia* and *Juglans californica* occupy drainages and some northerly aspects.

Minor changes in aspect are mirrored by major changes in the species present. Such diversity dictates site-specific prescriptions to assure regeneration and can aid in containing prescribed fires. Because of its compact structure and high proportion of fine stems, coastal sage scrub will more readily burn than chaparral when weather is mild and live-fuel moisture is high. Communities where *ceanothus* predominates can aid in containing a prescribed fire spreading in the sage scrub. As live-fuel moisture declines in the summer the ceanothus can then be treated.

Ceanothus spinosus should resprout reliably after burning or cutting. *Ceanothus megacarpus* may suffer poor regeneration if soils are moist during burning but otherwise should establish from prolific seedlings. The overstory trees of oak and walnut are a special resource that should be protected from fire. However, their understory can be burned during cool weather to eliminate accumulated ground fuels and produce a shaded fuel break.

Aerial photographs have been used to classify vegetation and site plots used to estimate such parameters as leaf area, total biomass, and dead material of the primary communities. This study is unusual in the level of detail being used to assess whether a full management program will significantly alter vegetation and its distribution in the chaparral community.

Stone Canyon has been divided into eight primary management zones as determined by small watershed boundaries, existing fuel breaks, and similar difficulty of treatment. Under the management plan, prescribed fire will be applied in stages extending over three to five years beginning in 1986. Carrying the treatments over time will allow us to detect and check the development of problems in application or plant community recovery.



The greatest flame lengths during the June 30, 1986 prescribed fire in upper Stone Canyon were produced in felled chaparral and adjacent *Ceanothus.*

The first treatment widened to 300 feet the existing hundred-foot clearance around structures by hand-clearing and burning of piled brush, although large individual shrubs, especially ceanothus and toyon, have been pruned to tree form where possible. The greatest management concern here is to avoid establishment of woody subshrubs such as buckwheat or black sage, which can result when the cover of mature chaparral is permanently reduced. These can accumulate a large mass of finely divided, small-diameter stems and dead wood and can propagate fire with even moderate weather and fuel moistures. Shrubs that resprout within this zone will be undisturbed.

Prescribed fire was applied in two stages to the upper small watersheds of Stone Canyon during late spring and early summer 1986. In the first stage, piled brush was burned during the early morning under low clouds and fog. High humidity and low air temperature were necessary to control spotting from the dead fuel. Fifteen engine companies from the city and ten fire-fighting crews from the county fire department were deployed to assure protection of structures and contain the fire. Some regeneration problems can develop from this work if seed is destroyed by prolonged soil heating beneath piled brush or if the scarification requirement for seed germination is not met where no fire is applied. Areas of *Ceanothus spinosus* were also felled in place and burned. Although this species sprouts vigorously, there could be some mortality if the shrub sprouts during the interval between cutting and burning.

In the second stage, twenty-six acres of crushed broadleaved chaparral and standing coastal sage and south-slope chaparral were burned on June 30. An additional fifty-two acres of south-facing chaparral were burned July 1. During burning the humidity averaged thirty-five percent, air temperature was 30° C., and wind speed was eight to twelve km/hr from the south to southeast.

Most of the chaparral and sage scrub burned was ignited from a low-flying helicopter by drip torch or helitorch. Beginning at the downwind fireline, successive passes ignited narrow strips of vegetation. Despite several attempts, the ceanothus could not be directly ignited. Large patches of coastal sage did support combustion with three- to six-meter flame lengths, spreading fire into some upslope stands of *Ceanothus megacarpus* and chamise. Chamise chaparral on southerly aspects burned readily the second day.

Future treatments may include understory burning in small oak woodlands and hand felling or mechanical crushing on moderate slopes of ceanothus or *Quercus dumosa* prior to burning to increase the dead fuel loading and allow fire to spread during more moderate weather. Late spring treatments will be used to avoid loss of ceanothus and coastal sage communities that must reproduce from seed. Firing will be avoided on steep, erosive, south-facing slopes.

The threat of catastrophic wildfire is a pervasive problem faced by the citizens of Los Angeles where urban development meets wildland chaparral. We see great promise in the Stone Canyon project for addressing this threat and building the public confidence and interagency cooperation necessary to manage chaparral lands at the sensitive wildland/urban interface.

Reference

Howard, R.A., D.W. North, F.L. Offensend, and C.N. Smart. 1973. "Decision analysis of fire protection strategy for the Santa Monica Mountains: an initial assessment". Menlo Park, California, Stanford Research Institute.

The diversity of vegetation within Stone Canyon and environs is shown in this computer generated classification of spectral data from a 12-channel thematic mapper simulator mounted aboard a high altitude aircraft. Six primary classes are shown in these two images: at the left are associations of *Quercus agrifolia-Juglans californica* (white), *Adenostoma fasciculatum-Rhus laurina* (gray) on south-facing slopes, and mixed chaparral on east-facing aspects (black); at the right are coastal sage scrub (white), north-facing associations dominated by *Ceanothus spinosus* and *Heteromeles arbutifolia* (gray), and east-facing stands of *C. spinosus* and *R. laurina* (black).