Part IV

Patterns Emerge From Study of Area Fire History

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When an organized fire protection agency was established in 1919 for the unincorporated areas of Los Angeles County, fuel loading in the Santa Monica Mountains was at a low level. Large-scale fires had burned the mountain range several times between 1900 and 1919. Principally among the many fires were the 1903 Rindge Fire, the 1909 Malibu Fire, the 1910 Las Flores-Temescal Fires, the 1911 Santa Monica-Ventura Fires, and the 1913 Topanga-Escondido Fires. The 1911 fire was the largest. It burned the mountain range for several weeks and extended from Santa Monica into Ventura County.

ANALYSIS OF FIRE PATTERNS

Further discussions will pertain to analyzing fires over 100 acres for the active fire suppression period 1919-1985. Figure 1 shows the total area burned per decade as well as the cumulative area burned, and illustrates that the overall burn cycle averages about 20 years. As the fuel loading of the inland chaparral increased, more and more of its vegetatation was incorporated into the burn cycle. This resulted in the steadily increasing peaks of acres burned as graphed [Figure 1].

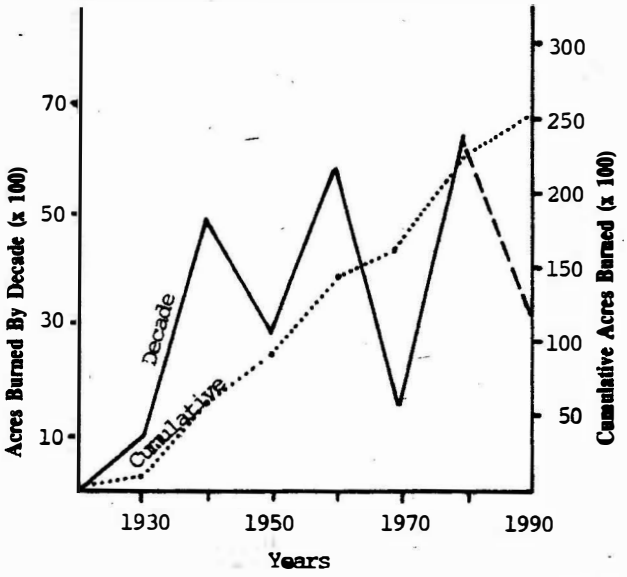

Figure 1: Area burned by fires over 100 acres (10 year periods are graphed)

Table 1 shows fire sizes and area burned. It also lists the total area burned by decade as graphed in Figure 1. The table and figure illustrate the cyclic fire patterns in the Santa Monica Mountains with an average fire frequency of about 20 years. Based upon this information, it was predicted that the total acreage burned from 1980-1989 would be about 30,000 acres. This is shown by a hashed line. But such predictions did not forsee the possibility of large scale fires overrunning the Malibu's from north of the Santa Monica mountains. The Dayton Canyon Fire, the first fire this century which started north of the freeway, did just that and burned all the way to the ocean. This accounts for the fact that the predicted 30,000 acres had already burned by July of 1985.

Table 1 clearly indicates that the age of the vegetation is the major cause for uncontrollable, large scale fires. Despite very limited fire equipment and just a few foresters on fire patrol from 1919-1929, less that 10,000 acres burned during this decade. As the fuel built up during the following decade there was a fivefold increase in acreage burned. Seemingly, with the use of the bulldozer the acreage burned was reduced to almost one-half during the next decade. But again, as the woody vegetation matured, fire size almost doubled with more acreage burned during the 1950's than 1930's. During the 1960's and with the advent of the helicopter, the acreage burned was seemingly reduced to almost one quarter from what it was the previous decade. But again, the major reasons for the reduction in acreage burned during this time period were the younger age classes of chaparral. During the 1970's mature and overmature vegetation again caused a fourfold increase in acreage burned.

Table 1 -- FIRE SIZE BY DECADE (in acres)

TIME PERIOD	SIZE OF FIRE 100-500	500-1,000	1,000+	AREA BURNED (in acres)
1920-29	6(1,425)	1 (600)	2 (7,618)	9,643
1930-39	3 (637)	0	5(49,417)	50,054
1940-49	4 (725)	0	4(28,792)	29,517
1950-59	6(1,410)	2(1,188)	6(55,002)	57,600
1960-69		1 (640)	3(15,190)	15,830
1970-79	4 (657)	0	6(64,755)	65,412
1980-85	5(1,039)	0	3(28,495)	29,534
	28(5,893)	4(2,428)	29(249,909)	258,230

Table 2: ACREAGE BURNED BY TIME OF YEAR (1919-1985)

TIME PERIOD	AREA BURNED (in acres)	AVERAGE # OF SANTA ANA DAYS(per mo.)	ACREAGE BURNED/ SANTA ANA DAY
January - June	3,518	5.0 (June)	
July	1,576	0	
August	5,624	0	
September	32,079	4.4	7,290
October	101,064	4.5	22,459
November	56,858	5.0	11,372
December	51,121	3.7	13,816
Total	251,840		

Table 2 and Figure 2 analyze the fires and acreage burned by time of year. From January through July the area burned was just 5,000 acres. It increased to 6,000 acres during August, increased by more than five times to 32,000 acres during September and again more than tripled to 101,000

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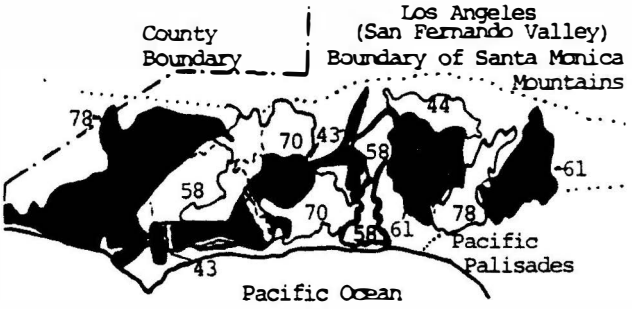
acres in October before decreasing to 56,000 and 51,000 acres in November and December respectively. October to December is a far more critical fire period than September. 89 percent of the acreage burned during September occurred on a single day in one fire [September 25, 1970]. The lag time necessary for the Santa Ana winds to dry out the vegetation is also seen in the fact that in September only 7,290 acres burned per Santa Ana day compared to a total of 22,459 acres per Santa Ana day for October. The effect of rainfall and fuel moisture can be seen the following month when the figure is reduced to 11,372 acres. The average temperatures and wind intensities were not considered in the above statistics so that they may be slightly altered when accurate, long-range Santa Ana weather statistics for locations in the Santa Monica Mountains are analyzed.

Individual fires seemingly show great differences in burning pattern. Some are confined to the inland regions and never reach the coast. Others are confined to the central region and never reach the coast, some burn along the coast, others burn across the whole mountain range. A history of fire behavior of selected fires follows in an effort to support the picture of the composite fire history discussed so far. The fires discussed are shown in Map 2.



Map 2: Fires that swept the mountain range from north to south.

FIRES IN INITIALLY STRONG NORTHWEST WIND CONDITIONS

The 1944 Woodland Hills Fire started near the Ventura Freeway and, fanned by northwest winds, spread in a southeastern direction for about 9 km. Mulholland Highway was an effective fire barrier on its southern flank and limited the size of the fire. Large-scale fires during northwestern wind conditions have historically been effectively controlled with aggressive backfiring, hose lines and tractor work. The present use of helicopters, though not as effective as aggressive backfiring against a frontal fire, nevertheless limits these fires in size with the slightest break in fire weather.

FIRES IN SANTA ANA AND ONSHORE WIND PATTERNS

During the 1935 Latigo [Malibu] Fire light northeasterly winds allowed the local updraft mountain winds to spread the flames upslope and toward the ridge line where they were picked up by the light Santa Ana breeze and pushed toward the west. Hot spots still burning in the canyons would lay down at night but would be whipped into flames early in the morning, making another run for the ocean. Onshore winds and local surface winds would push the fire again uphill and easterly upslope. Aggressive backfiring on a 27 km wide front finally contained the north and eastward spread of the fire. Thus Santa Ana winds coupled with local winds are responsible for spreading flames in both directions.

SANTA ANA FIRES FROM COASTAL RIDGES TO THE COAST

The 1956 Newton Fire started in the upper Newton Canyon watershed at the coastal ridge and raced to the beach while fanning out east and west. Changing wind patterns make the coastal mountain slopes vulnerable to east as well as westward fire spread, but quick aerial response and ground access make it now possible to limit the eastward spread of a coastal ridge fire.

SANTA ANA WINDS FIRES SPREADING FROM HIGHWAY 101 OR MULHOLLAND HIGHWAY TO THE COAST

Fires starting along the inland boundaries of the mountain range will normally become large if they are pushed by strong Santa Ana winds. Such fires were unknown from 1919-1935, were uncommon until 1957, but have since then occurred at least once every decade. Examples of such fires are the 1943 Woodland Hills Fire, the 1956 Sherwood Fire, the 1958 Liberty Fire, 1961 Topanga and Bel Air Fires, the 1970 Wright Fire, and finally the 1978 Kanan-Dume and Mandeville Fires. The 1978 twin fires burning through stands of chaparral in excess of 50 years old show the reliance on the north to northeasterly winds to set fire boundaries despite an army of men and a fleet of modern fire fighting equipment. There is really no effective means of controlling such fires until the wind dies down or the fire runs out of fuel.

FIRE BOUNDARIES, FIRE FIGHTING TECHNIQUES

As the wind dies down, fire barriers such as firebreaks, roads and even previous burns as old as 20-30 years can become important fire boundaries. For example, the southwestern extent of the 1978 Kanan-Dume Fire was checked and prevented from crossing into Ventura County by the 1-year old Carlisle burn. Flames in the 1-year burn were supported by dead stands of aerially seeded annual ryegrass [Lolium multiflorum] and dead herbaceous annuals, but the low intensity flames were stopped on Decker Road despite winds gusting in excess of 60 km/hour. The westerly flank of the 1958 Liberty Fire was prevented from reaching the beach but not before it had crossed Latigo Canyon Road and burned several miles into a 2-year burn. The southwestern extension of the 1970 Wright burn was also checked by a 3-year old burn. The 1978 Mandeville burn wedged between the 1961 Topanga and Bel Air Fires and made a run in chaparral stands in excess of 40 and 63 years. It was prevented from reaching the beach when it ran out of fuel in urban developments and the strongly gusting Santa Ana wind subsided.

The 1935 Latigo Fire is of interest in that the northern extent of the fire was slowed down when burning through a 10-year old burn. An indication that the chaparral was not highly flammable is shown by the large unburned stands along the northern boundaries of both the 1925 and 1935 burns.

The shapes of both the 1958 Warner Fire [Hourglass] and the 1943 Woodland Hills Fire indicate the successful use of aggressive backfiring and/or pinching off the flanks of fires by taking advantage of strategic fire barriers, such as firebreaks, roads and previous burns. The 1943 fire stretched like a worm from Woodland Hills to Point Dume, an aerial distance of approximately 23 km. It showed that southwesterly spreading fires, even when pushed only occasionally by Santa Ana winds, are hard to control. Prior to the use of helicopters, constant flareups when the winds

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picked up converted many seemingly controlled fires into uncontrolled fire disasters. The value of a helicopter thus lies in extinguishing fires through aerial water drops as soon as the wind dies down and extinguishing many spot fires before they can become major new fires.

CONCLUSION

This study showed that the coastal slopes of the Santa Monica Mountains had a higher fire frequency both in the prefire suppression period 1900-1918 as well as in the fire suppression period 1919-1985. During this latter period, the higher fire frequency was found predominantly in the coastal vegetation. Fire suppression was more successful in the inland chaparral regions. This resulted in a steady fuel buildup and a shift from small to large disastrous fires. The area investigated showed a cyclic periodicity in area burned of about 20 years. Coastal sage vegetation is able to carry large-scale fires within 10 years after a burn, south slope chaparral within about 15 years, and north slope chaparral within about 20 years.

Most large-scale fires occur during the Santa Ana fire wind conditions from mid-September through December. The probability of large-scale fires is also enhanced by the linearity of the fire winds and the canyons. When taking into account fuel type, topography and other site specific factors, it is therefore possible to predict the occurrence of large-scale fires and use fire management techniques, inclusive of fire exclusion and prescribed burning to reduce high fire risks. In the next article we will explore fire management alternatives for the Santa Monica Mountains.