

Chaparral in Southern California¹

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Description of Southern California Chaparral

The term chaparral comes from the Spanish word "chaparro" because the early Spanish explorers were reminded of the dense scrub oak found in the Mediterranean Region. Today, the term is applied to dense evergreen brushfields in general. Chaparral lands in this discussion will include predominantly brush-covered lands and brush-hardwood-conifer transition zones, transected by riparian vegetation.

Chaparral vegetation is a product of a "Mediterranean" climate system. In Southern California, Mediterranean-type climate is characterized by moderate, moist winters with long, hot, dry summer periods. Rainfall is generally sparse (12 to 24 inches/300-600 mm) and often occurs in a few high intensity winter storms. Summer temperatures often exceed 100 degrees Fahrenheit (38 degrees Centigrade) and relative humidities are low, sometimes dropping to less than 5 percent. Most critical for management are the dry and often warm Santa Ana winds, blowing from the desert to the sea and sometimes reaching up to 100 miles per hour (160 kph).

Most of the chaparral in Southern California Mountain Ranges is found at elevations between 1,000 and 10,000 feet (300 and 3000 meters). Typically, these ranges are geologically young and still growing. A high percentage of chaparral is found on steep slopes. Soils vary considerably depending on topography, geology and climate prevailing in a particular area. Soils throughout the range are generally very porous, consisting mostly of decomposed granite. Chaparral soils tend to be very low in essential plant nutrients, with nitrogen often the most limiting nutrient. Following fires, erosion rates can be extremely high. Also, high

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Abstract: Chaparral is the most extensive vegetation type in California, covering over one-twentieth of the State or some 13.2 million acres (5.34 million ha). For thousands of years the vegetation in Southern California had very little impact from human use and activity, but in the past three decades this situation has changed with the increasing population. There are over 13 million people now living in Southern California. Eighty years of maintenance management of chaparral lands have generally resulted in extensive areas of decadent or very mature vegetation that is highly flammable and virtually impenetrable to wildlife, livestock, and man.

intensity fires often produce a water-repellant layer in the soil which greatly increases runoff.

The chaparral landscape is a continuous cover of low-growing shrubs creating a mosaic in shades of green, but individual plants have certain diagnostic features in common. The plants are most easily identified by their leaves. Leaves are characteristically evergreen, small, thick, and stiff in order to cope with drought periods. The common genera of Southern California chaparral are Adenostoma, Arctostaphylos, Ceanothus, Quercus, Heteromeles, and Rhus. Factors that affect the distribution of different chaparral species in Southern California are the local climate changes due to coastal or desert exposures; changes in elevation, slope and aspect.

Fire is a key element in the life cycle of the chaparral type. Seasonally, the moisture content of chaparral species can fluctuate rapidly. It is not uncommon for fuel moistures to drop to 8-13 percent during summer drought periods or during Santa Ana wind conditions. In addition, close spacing and continuity of vegetation cover plus high surface-to-volume ratios in the chaparral community leads to a high percentage of available fuel. Over time, the ratio of dead to live material increases dramatically. For example, by age 30, often as much as 50 percent of the standing mass of the crowns in a chamise stand can be dead and more material accumulates as litter on the ground. All these factors result in rapid ignition and spread of fires. Where fuel conditions are uniform over broad areas, fires tend to be quite large.

Because chaparral has evolved with fire, the vegetation has developed distinct survival mechanisms. Many shrub species found in Southern California resprout from root crowns following fire. Most species require heat treatment before the seeds will germinate. Seeds can survive for extremely long periods of time in soil.

Chaparral is the most extensive vegetation type in California, covering over one-twentieth of the State or some 13.2 million acres (5.34 million ha). Chaparral in Southern California covers in excess of 3.4 million acres (1.38 million ha). The Angeles, Cleveland, Los

Padres and San Bernardino National Forests encompass approximately 3.4 million acres (1.38 million ha). In excess of 60 percent of this National Forest land is covered with chaparral. Consequently, management of chaparral lands is an increasingly important part of National Forest resource management activities.

History

For thousands of years the vegetation in Southern California had very little impact from human use. It is adequately documented that California Indians set fires to chaparral at the time of first contact with white settlers. However, the frequency of, reason for, and seasonal patterns of burning by the Indians are not at all clear. Viewpoints range from assuming deliberately set fires to modify vegetation and thus yield more plant products, to support game or accomplish game drives, to nothing more than escaped campfires. We do know that the Indians had no way of suppressing fires. Fires would have to burn until reaching a natural barrier.

The first Spanish explorers arrived in Southern California in 1769 and established the San Diego Mission. In the early settlement of Southern California, the chaparral foothills formed logical boundaries for Spanish land grants which formed the basis of early California rancho economy based on livestock grazing and mission agriculture. The chaparral zones merely separated the mountain forests from the flat or tillable lands.

In the period from 1769 to the early 1800's man's impact on the vegetation was roughly concentrated in a ten-mile radius around missions and pueblos. To these early settlers, chaparral was mainly a source for game animals. Into the 1860's chaparral lands were used somewhat for grazing, although sheepherders found these lands unusable unless charred by fire. To miners these lands were a source of charcoal for processing ore, but equally a tough barrier to easy prospecting and cross-country travel.

In the late 1800's, water coming from the chaparral areas and above was considered the lifeblood of the intensive irrigation agriculture of fruit and citrus on the valley floor. Extensive dams were built during this period for irrigation, and small hydro-electric power plants sprung up in the canyon bottoms.

In 1892 and 1893 the first forest reserves, later to become the Angeles, Cleveland and San Bernardino National Forests, were established by the U.S. Congress to protect the mountain watersheds from destructive fires. These forest reserves were created in direct response to the vigorous appeals by local citizens. Creation of the Southern California reserves was in contrast to creation of other forest reserves in the west where eastern conservationists fought for their establishment in defiance of local wishes.

The early 1900's saw the formation of local citizen groups in Southern California to further the cause of watershed protection and conservation. These citizens were convinced that the fate of Southern California either as an agricultural domain or metropolis resided in the reliability and quality of its water supply. Pressure from these citizen groups led to the first Federally appropriated funds to construct fire lanes on the southern slopes of the San Bernardino Mountains. During this period, fire control in chaparral areas became more systematic and organized.

From 1910 to 1920 the advent of the automobile led to a sharp increase in the use of the forest watersheds for recreation purposes. This led to a large increase in fires caused by campers. The Forest Service recognized recreation as a major forest resource, and improved public campgrounds were established to meet the needs of campers as well as fire prevention. Large fires continued to occur and the decade of the 20's closed as one of the most severe fire loss periods in Southern California history. On the four National Forests in Southern California some 913,700 acres (369,900 ha) were burned. (This figure includes National Forest land only, and not the extensive burned areas outside the Forests' boundaries)

The 1930's saw the great depression and the establishment of the Civilian Conservation Corps (CCC) "to relieve distress, build men and build up the Nation's Forest resources". This led to the building of firebreaks, fire trails, look-outs, reforestation of burned areas, construction of recreation facilities, Ranger Stations, and road, range and wildlife improvements, etc. All of these men were trained as effective fire crews, and burned acres in Southern California, particularly in the chaparral areas, dropped to some 395,700 acres (160,200 ha). This figure remained fairly constant in the 1940's.

The 1950's saw a sharp upturn in burned acreage. The biggest impact undoubtedly came from a doubling of Southern California's population to more than five million people in 1950. Public use of the Forests also doubled, leading to increased fire occurrence. Public concerns increased over massive soil erosion and water losses following fires in chaparral areas. This led to formation of more citizen groups and the establishment of more agency regulations to improve watershed protection. In the late 1950's the fuelbreak and type conversion concepts of removing chaparral and replacing it with grasses were developed and began to be implemented.

From 1960 to 1970 the population doubled again to over 12 million people. Most of this growth occurred in the valley and foothill areas below the chaparral watershed areas. Unique to the San Bernardino National Forest, growth also accelerated within its boundaries. Fire losses began to seriously affect personal property and residences during this period. Citizens and

Congress, through the National Forest Management Act and other legislation, emphasized the importance of proper land use planning and vegetative treatment in chaparral areas.

Basically since World War II, fire suppression equipment and techniques have made great progress. Most fires today are suppressed at a few acres. Total acres burned per decade have decreased, which has resulted in many older stands of chaparral. All of these factors have contributed to the accumulation of more dead material in chaparral. Today, when fires occur under extreme weather conditions (usually Santa Ana winds) they are extremely devastating, capable of jumping fuelbreaks and super highways and destroying lives and property.

In the past, citizens affected by devastating fires demanded more effective fire protection. However, in the past decade, new concepts have begun to emerge relative to managing the chaparral resource. With over 13 million people currently living in Southern California, ways of living in harmony with the chaparral system are becoming more and more important. Our management priorities are beginning to reflect that need.

Present Uses

During the fall of 1980, the San Bernardino National Forest experienced the most devastating fires, from a damage standpoint, in the history of the Forest. One of these, the Panorama Fire, started on November 24, 1980 during severe Santa Ana winds that often reached gusts of 100 miles per hour (160 kph). Before the fire was contained five days later, four deaths were attributed directly to the fire, 284 homes were totally destroyed, 49 other homes were damaged, 64 other structures were lost or damaged, and numerous vehicles were destroyed. Structural losses alone amounted to over \$28 million, watershed losses were \$11.8 million and suppression costs were in excess of \$5 million. Numerous examples of devastating fires can be found in Southern California dating back to the early 1960's.

Water continues to be one of the most valuable commodities on chaparral areas in Southern California. Chaparral watersheds produce water used for recreational, agricultural, domestic and industrial purposes. Water produced locally in Southern California is extremely valuable and becomes more so each day as energy costs to import water are rising rapidly. The chaparral watersheds also play an extremely important role in preventing downstream flooding.

Numerous examples of serious life and property loss from water and mud flows occur after chaparral vegetation is removed by fire. Maintaining stability and productivity of these watersheds is extremely important. Past practices to protect and manage this resource have included construction of fuelbreaks and type

conversions. In the future, prescribed fire as a means of managing the age classes in chaparral will receive greater emphasis and the fuelbreaks and type conversions will help accomplish the overall objectives of age-class management.

Though the range resource is limited in Southern California, livestock often graze on type-converted areas and established fuelbreaks in chaparral. Grazing serves a dual purpose; maintaining fuelbreaks and type-converted areas, as well as producing red meat for the market.

Wildlife species, particularly large animals such as deer and bighorn sheep, have certain habitat needs which are benefited by prescribed fire. Manipulation of the chaparral vegetation is necessary to maintain habitat and ensure animal and plant diversity.

The chaparral areas in Southern California provide a visual backdrop for millions of Southern California residents and are used fairly extensively for recreation activities. These activities include hiking, off-road vehicle use, hunting, fishing, camping and picnicking both in developed and unimproved sites, shooting and plinking, etc. Most of these activities occur during the fall, winter and spring months when temperatures are cooler. Large areas of chaparral on the Southern California National Forests are closed to public access during the summer and fall months for fire prevention purposes. These closures have been in existence since the 1920's and limit some recreation opportunities. The need for fire closure is now being questioned.

The 13 million people living in Southern California look to National Forest lands, including chaparral, to meet residential and consumer needs. Chaparral lands are being used for home sites; waste disposal sites, including solid and liquid waste; industrial sites; utility corridors; mining operations; communications centers; etc. The physical location of chaparral adjacent to the population centers in Southern California and the fact that the growth rates are steadily increasing, adds new impacts each day. Most of the major impacts are occurring where cities, towns, and agricultural lands encroach directly into the chaparral-covered foothills. Management of these areas forming the urban/rural/wildland interface is complicated because numerous small landowners are involved. In addition to different owners, many different Federal, State, County and local governmental agencies have overlapping jurisdictions in these areas. Management of these chaparral interface lands provides one of the greatest challenges for interagency cooperation ever known in the nation, and one which needs the utmost support from all agencies.

Research

Currently, the Forest Service Pacific Southwest Forest and Range Experiment Station is in a five-year effort to develop, test, and demonstrate a wide range of options for maintaining or increasing the productivity of chaparral and related ecosystems. The study area is a 127,000 acre site on the Cleveland National Forest called the Laguna-Morena Demonstration Area. Goals for the demonstration area are to develop new ideas for chaparral management and test techniques that can be used elsewhere; to monitor the environmental impacts of these techniques; to demonstrate the effectiveness of these techniques to a concerned public; and finally, to reduce the potential for catastrophic wildfires. Numerous Federal, State and local agencies are cooperating in the study.

Current Management Direction for N.F. Chaparral Lands in Southern California

Eighty years of maintenance management of chaparral lands have generally resulted in extensive areas of decadent or very mature vegetation that is highly flammable and virtually impenetrable to wildlife, livestock and man. Management of chaparral lands and related vegetation has been identified as a major issue in the Forest Land and Resource Management Plans that are currently being developed on the Southern California National Forests. These plans will guide all future management activities on these Forests.

The crux of the chaparral issue is the management of chaparral lands in order to achieve an integrated resource program. What suitable uses can be identified for chaparral-covered slopes that will be compatible with other uses? What can we expect in the way of outputs, costs, and effects by implementing a range of vegetation management alternatives in the chaparral?

The chaparral management issue will be driven by the many diverse interests of the public and concerns of resource managers. Fire control agencies who seek ways to reduce fire losses will have significant impact. The livestock industry,

which wants to increase the amount and value of forage, has concerns. The wildlife managers who must manage for wildlife habitat diversity have objectives to be met. Watershed managers want to manage cover to protect water quality and also exercise opportunities to increase water yield. Botanists have concerns for managing threatened and endangered plant species and maintaining species diversity. Consumers who want to harvest the chaparral commodities for energy purposes (heat) will have input. Hunters and recreationists want easy access through chaparral lands where impenetrable thickets now prevail. Many other people will be expressing their personal opinions and concerns for managing chaparral lands.

Conclusion

The Forest Service and other land management agencies have a real challenge ahead in responding to public needs and providing sound management of the vegetation resource over time. The time is right --we eagerly accept the challenge.

References

- Aschmann, Homer. Man's Impact on the Southern California Flora, Symposium Proceedings, Plant Communities of Southern California; California Native Plant Society; 1976; 40-48.
- Bauer, Don R. Forest Fire Control in Southern California - A Short Story. San Bernardino, California; U.S.D.A. Forest Service; 1973.
- Hanes, Ted L. The Vegetation Called Chaparral. Symposium on Living With the Chaparral; Los Angeles; Sierra Club; 1973; 1-5.
- Unknown. California Chaparral; Terrestrial Vegetation of California. New York: John Wiley and Sons, Inc.; 1977; 417-469.
- Watershed and Chaparral Management Situation Statement for Regional Planning; San Francisco, California; U.S.D.A. Forest Service; Pacific Southwest Region; 1981.