133.1 Californian (Coastal) Chaparral

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Chaparral is the main vegetation of southern California and much of northern Baja California. It conspicuously covers extensive mountain, hillside, and foothill landscapes between the Sonoran and Mohave Deserts and the coast. Largely cismontane, it occurs from as high as 2,750 m in the Transverse Ranges down to less than 50 m elevation near the Pacific Ocean (Cooper, 1922). Shrub heights vary from as low as 1 m to more than 3 m on some of the higher slopes, but the physiognomy is remarkably uniform throughout (Fig. 48). Floristic diversity is high, however, with nearly 900 species of vascular plants being associated with this biome (Ornduff, 1974).

Like most chaparral areas around the world, Californian chaparral is found in a "Mediterranean"-type climate, characterized by cool, wet winters, and a hot, dry growing season. Total mean annual precipitation ranges from 300-375 mm to more than 760 mm in the higher montane associations. More than 75% of this precipitation falls from October through April (Table 10), with less than 20% coming in the 6 months when mean monthly temperatures are likely to exceed 15° C (May through October). Much of this rainfall results from a small number of intense polar marine winter storm systems. The periodic 6-month dry period coincides with high temperatures, further accentuating the seasonal drought. As rainfall declines and maximum temperatures begin rising in April or May, the chaparral begins drying, and by July or August is highly flammable. This condition is aggravated by the "Santa Ana winds" and may persist well into fall, sometimes resulting, as in 1977, in uncontrollable fires that sweep over thousands of hectares.

Chaparral is well adapted to seasonal drought and fire. After burning, many chaparral species readily regenerate as sprouts or from heat-scarified seeds. Although the immediate post-fire community may differ markedly from that before burning, at least in herbaceous components, within a few years the original chaparral species reestablish themselves and firmly control the site—until the next fire.

The hard "sclerophyll" leaf is a diagnostic feature of chaparral plants. Leaves tend to be small, hardened (preventing wilting during periods of extreme drought), and evergreen. Leaves of a given year are not cast until the next year's leaves are set; hence the shrubs have some leaves even during protracted drought periods. This physiognomic feature differentiates chaparral from the periodically leafless montane scrub and thornscrub of cold temperate and tropic-subtropic regions.

Chaparral typically occurs on steep mountain slopes but also occupies outwash plains, "bajadas" and other thin-soiled habitats. It is found growing on a variety of geologic parent materials but reaches its best development on deeply fractured and weathered coarse-grained granite and gneiss. Soils may be shallow to deep, are usually well-drained, permitting deep percolation into the regolith. On steeper slopes, erosion rates are commonly too high to permit soil horizon development (Horton and Kraebel, 1955). Nutrient status, at least when compared to woodland or grassland soils, tends to be low.

Because of its importance as watershed cover in high erosion risk areas, Californian chaparral has been the subject of a number of intensive studies. A comprehensive review of major chaparral communities was prepared by Hanes (1977).

Table 10. Precipitation data from five stations in the Southwest within and adjacent to Californian Chaparral.

Station	Elevation (in m)	Mean monthly precipitation in mm												Total	Total Oct. thru April	Percent of total
		J	F	M	A	M	J	J	A	S	O	N	D			
San Gabriel Dam, CA 34°12′ 117°52′	451	154	132	102	67	10	2	0.5	1	5	23	91	114	702	683	98
Lytle Creek R.S., CA 34°14′ 117°29′	832	189	154	134	83	13	2	2	2	6	20	91	129	825	800	94
Descanso R.S., CA 32°51′ 116°37′	1,067	100	87	106	64	21	3	6	11	8	19	59	90	574	525	91
San Juan de Dios, BCN 32°08′ 116°10′	1,410	51	38	42	38	8	2	23	17	14	12	33	57	335	271	81
Sierra Juarez, BCN 31°45′ 115°49′	1,410	33	35	42	31	5	1	11	26	20	12	40	49	305	242	79

The following vegetative descriptions cover the major chaparral associations in the Southwest in southern California and Baja California Norte.

Chamise Series

This community is a frequent dominant in southern California chaparral, where it forms extensive stands in the mountains of Los Angeles, Orange, San Bernardino, Riverside, and San Diego Counties, and in Baja California Norte. It is characterized by nearly pure Chamise (*Adenostoma fasciculatum*), with minor amounts of *Ceanothus* spp., Bigberry and Eastwood Manzanita (*Arctostaphylos glauca* and *A. glandulosa*), White and Black Sage, California Buckwheat, California Scrub Oak, Sugarbush and Laurel Sumac (*Rhus laurina*). The Chamise chaparral forms dense, matted stands with interwoven branches, making an almost impenetrable stand at maturity. Little or no herbaceous understory occurs in mature or senescent stands, but a moderate postfire flora develops which may persist for several years. Mature stands reach 90% cover in 25 years, but this cover may decline with senescence.

Recovery from fire is somewhat slower in Chamise chaparral than in some other chaparral types, partly because of the generally poor soils on which it grows. Stands become decadent at about 50 to 75 years with little or no replacement. Periodic fires appear essential to maintain this association in a vigorous condition.

Ceanothus Series

Ceanothus may occur as nearly pure stands of a single species, e.g., Hoary Leaf Ceanothus (*C. crassifolius*), or as a co-dominant with Chamise, Scrub Oak, Toyon (*Heteromeles arbutifolia*), or Sugarbush. Ceanothus usually occurs on wetter sites than Chamise, and is most prevalent on the coastal side of the Peninsular Ranges. It is rarely found above 1,200 m elevation (Horton, 1969).

Ceanothus chaparral regenerates readily from seedlings as well as sprouts after fire, and its early rapid growth rate and high crown density make it a strong early competitor to associated species that commonly regenerate from sprouts. Recovery after fire is more rapid than in Chamise, partly because of the better sites on which these associations occur. Within a decade of burning, Ceanothus stands approach 50% crown cover, and in 50 years, from 80% to 100%. As a generation of plants mature, the short-lived Ceanothus begins to die out, opening the stand. Overmature 50- to 70-year-old stands may regress to only half the cover value of young, healthy stands, opening the way to replacement by other species. Ceanothus is, therefore, considered a successional chaparral community in southern California.

Manzanita Series

Less extensive than Chamise or *Ceanothus* chaparral, Manzanita (*Arctostaphylos* spp.) is a characteristic, easily identified type of the southern California mountains. It usually occurs at the higher moister elevations and on deeper soils. Consequently, it often occurs below or intermingled with the lower fringe of the montane conifer forest. Some manzanita stands are "pure," but associations found in the Manzanita series include: California Scrub Oak, Chamise, Ceanothus, Birchleaf Mountain-mahogany (*Cercocarpus betuloides*), Chinquapin (*Castanopsis sempervirens*), Coulter Pine (*Pinus coulteri*), and Fremont Silktassel (*Garrya fremontii*).

About half of the dozen or so manzanita species sprout after burning; the rest germinate readily from heat-scarified seeds. Although the series is well adapted to recurrent fires, if the recurrence interval is less than the time required to reach maturity and set seeds, a decline in the non-sprouting species can be expected. Abundant annuals and short-lived perennials develop in the first post-fire rainy period, often turning a fire-blackened landscape into a fantastic flower garden (Sweeney, 1956). A successional stage of a mixture of chaparral and coastalscrub species occurs at lower elevations in these and other chaparral series. Mature stands over 50 years of age may reach 100% cover except on poor sites, where the cover may be less than half that.

Scrub Oak Series

Quercus dumosa is a mesic association unimportant in areas with less than 508 mm precipitation. It occurs mainly on northerly aspects on lower sites but may occupy all aspects at higher elevations. This series is rich in species, and a great variety of large shrubs and woody vines participate. Crowns are from 2 m to 5 m high, and may extend downward almost

Figure 48. *Mixed sclerophyll community in the Santa Ana Mountains, Cleveland National Forest, Orange County, California. Dominant or at least prevalent shrubs in the chaparral at this location (ca. 1,100 m elevation) are California Scrub Oak* (Quercus dumosa), *several species of* Ceanothus, *manzanita* (Arctostaphylos), *and mountain-mahogany* (Cercocarpus). *Note the almost complete ground cover.*

to ground level. A heavy litter is usually present; understory forbs and grasses are sparse, except in scattered openings.

Common associates include Birchleaf Mountain-mahogany, Chaparral Whitethorn (*Ceanothus leucodermis*), Toyon, Holly-leaved Cherry (*Prunus ilicifolia*), Hollyleaf and California Buckthorn (*Rhamnus crocea* and *R. californica*), honeysuckle (*Lonicera* spp.), silktassels (*Garrya* spp.), California Fremontia (*Fremontia californica*), Poison Oak (*Rhus diversiloba*), and a deciduous Two Petal Chaparral Ash (*Fraxinus dipetala*). Scrub Oak, like its major associates, sprouts vigorously from the root crown following fire. Because it usually occurs on better sites, regrowth is rapid. The secondary growth commonly shows a 50% to 60% crown cover at 10 years, reaching a maximum of 80% to 100% cover in 50 years.

A number of other important series of lesser extent have been described within California chaparral, e.g., Red Shanks (*Adenostoma sparsifolium*) chaparral (Hanes, 1977; Fig. 49), Mountain-mahogany chaparral, Live Oak (*Quercus chrysolepis*) chaparral, and mixed chaparral series. These communities share with those already mentioned a more or less short statured, closed physiognomy and dominance by one or more sclerophyll species of *Quercus, Adenostoma, Ceanothus, Cercocarpus, Arctostaphylos, Rhus,* or *Garrya.*

Canyon bottoms and other mesic sites within the chapparal are frequently wooded (Californian evergreen forest or woodland or, at its upper limits, Sierran montane conifer forest). The chaparral's lower and more xeric contacts are typically with Californian coastalscrub—less commonly grassland. Frequently, individual, scattered trees of *Pinus, Juniperus,* or *Quercus* punctuate the chaparral and at the higher elevation (1,200 m) there may be much contact with the yellow pines and canyon live oaks of the respective Sierran montane conifer and Californian mixed evergreen forests.

Californian chaparral is the evolutionary center for a large number of vertebrates, many of which are so well adapted to it as to be uncommonly found elsewhere. Foremost of these among the mammals are the Brush Rabbit (*Sylvilagus bachmani*) and California Mouse (*Peromyscus californicus*). Other, more catholic Californian mammals well represented in chaparral are the Mule Deer (*Odocoileus hemionus*), Gray Fox (*Urocyon cinereoargenteus*), Merriam Chipmunk (*Eutamias merriami*), Dusky-footed Woodrat (*Neotoma fuscipes*), Nimble Kangaroo Rat (*Dipodomys agilis*), California Pocket Mouse (*Perognathus californicus*), and Brush Mouse (*Peromyscus boylii*).

Some species of birds are also largely confined to Californian chaparral—Mountain Quail (*Oreotyx pictus*), Wrentit (*Chamaea fasciata*), California Thrasher (*Toxostoma redivivum*), and a few others as the Anna Hummingbird (*Calypte anna*) are best represented there. Still other scrub adapted

Figure 49. *Californian chaparral of Red Shanks* (Adenostoma sparsifolium) *between Santa Rosa and San Jacinto Mountains, San Bernardino National Forest, California, ca. 1,340 m elevation. The light areas on the mountains in background are sites of recent fires.*

species are as equally at home there as in other scrub biomes including *interior chaparral.* Examples of these latter species are the Scrub Jay (*Aphelocoma coerulescens*), Dusky Flycatcher (*Empidonax oberholseri*), Bewick's Wren (*Thryomanes bewickii*), Orange-crowned Warbler (*Vermivora celata*), Bushtit (*Psaltriparus minimus*), Rufous-sided Towhee (*Pipilo erythropthalmus*), Brown Towhee (*P. fuscus*), Lazuli Bunting (*Passerina amoena*), Black-chinned Sparrow (*Spizella atrogularis*), and Rufous-crowned Sparrow (*Aimophila ruficeps*).

Few, if any, reptiles have their distribution restricted to chaparral per se. However, in the Southwest, the San Diego Alligator Lizard (*Gerrhonotus multicarinatus webbi*), Granite Night Lizard (*Xantusia henshawi*), and Striped Racer (*Masticophis lateralis*) are mostly within this biome. Other reptiles to be expected in Californian chaparral habitats in the Southwest are the Western Fence Lizard (*Sceloporus occidentalis*), Sagebrush Lizard (*S. graciosus*), Coast Horned Lizard (*Phrynosoma coronatum*), Coastal Rosy Boa (*Lichanura trivirgata roseofusca*), Western Patch-nosed Snake (*Salvadora hexalepis*), California Glossy Snake (*Arizona elegans occidentalis*), Western Blackheaded Snake (*Tantilla planiceps*), California Lyre Snake (*Trimorphodon biscutatus vandenburghi*), Red Diamond Rattlesnake (*Crotalus ruber*), and Western Rattlesnake (*C. viridis helleri*).