

## Vegetation Descriptions

# SOUTH COAST AND MONTANE ECOLOGICAL PROVINCE

## CALVEG ZONE 7

March 30, 2009

Note: This Province consists of the Southern California Mountains and Valleys Section or "Mountains" (M262B) and the Southern California Coast Section or "Coast" (262B)

Note the slope gradients as follows:

- High gradient or steep (greater than 50%)
- Moderate gradient or moderately steep (30% to 50%)
- Low gradient (less than 30%)

### CONIFER FOREST / WOODLAND

#### DM

#### BIGCONE DOUGLAS-FIR ALLIANCE

Bigcone Douglas-fir (*Pseudotsuga macrocarpa*) - dominated stands are found in the Transverse and Peninsular Ranges from the Mt. Pinos region south. The Bigcone Douglas-fir Alliance is defined by the clear dominance of this species among competing conifers. It has been mapped sparsely in four subsections in the Coast Section, and infrequently in seven subsections and abundantly in four subsections of the Mountains Section. These pure conifer or mixed conifer and hardwood stands occur at lower elevations, generally in the range 1400 – 5600 ft (426 - 1708 m) in the Coast Section and up to about 7000 ft (2135 m) in the Mountains Section. Although mature individuals are capable of sprouting from branches and boles after burning, intense or frequently repeated fires and drought cycles will tend to eliminate this conifer. However, Bigcone Douglas-fir may become locally dominant with Canyon Live Oak (*Quercus chrysolepis*) as an associated tree on protected mesic canyon slopes, but not at the highest elevations. Sites in this Alliance are usually north facing at lower elevations and south-facing or steeper slopes at upper elevations. Shrub associates commonly include species of *Ceanothus*, Birchleaf Mountain Mahogany (*Cercocarpus betuloides*), California Buckwheat (*Eriogonum fasciculatum*), Chamise (*Adenostoma fasciculatum*), and shrub forms of the Live Oaks (*Quercus* spp.).

#### DP

#### DOUGLAS-FIR – PINE ALLIANCE

This alliance is a combination of Bigcone Douglas-fir (*Pseudotsuga macrocarpa*) and Ponderosa Pine (*Pinus ponderosa*) that usually occurs on moderately steep slopes within an elevation range of about 3600 – 7000 ft (1098 – 2135 m) in this zone. These sites are scattered in four subsections of the Mountains Section. Canyon Live Oak (*Quercus chrysolepis*) is the most common hardwood associate in mixed stands. On more productive sites, this type will be mapped as a Mixed Conifer – Pine Alliance with the addition of other conifers such as Coulter Pine (*P. coulteri*), White Fir (*Abies concolor*), Sugar Pine (*P. lambertiana*) and Incense Cedar (*Calocedrus decurrens*). Less productive or recently burned sites found adjacent to this type are often occupied by hard chaparral shrubs such as Birchleaf Mountain Mahogany (*Cercocarpus betuloides*), shrub forms of Canyon or Interior Live Oaks (*Q. c.* var. *nana*, *Q. wislizenii* var. *frutescens*), and species of *Ceanothus*.

#### EP

#### EASTSIDE PINE ALLIANCE

Jeffrey Pine (*Pinus jeffreyi*) dominates this open forest type that is found on the transmontane side of the crests of the San Bernardino and San Gabriel Mountains in the Mountains Section. The alliance has been mapped abundantly in the Northern Transverse Ranges and Upper San Gorgonio Mountains Subsections and occasionally in five others of this section. Elevations of pure stands are in the order of 4400 - 9400 ft (1342 - 2864 m), while stands mixed with a hardwood understory are slightly lower, commonly up to 7800 ft (2378 m). Black and Canyon Live Oaks (*Quercus kelloggii*, *Q. chrysolepis*) are the most common hardwood associates. Slopes range from low to steep gradients, Canyon Live Oak often being on the steepest sites. Species of semi-arid environments such as Big Sagebrush (*Artemisia tridentata*) and Rabbitbrush (*Chrysothamnus* spp.) are associated with and define this type. It occurs adjacent to the more mesic Jeffrey Pine Alliance, which generally lacks the semi-arid understory elements. The Eastside Pine Alliance is usually found north of it in this zone, is more subject to Mojave

Desert climate environments and borders on the more xeric Pinyon - Juniper Alliance (P. monophylla) in the northern Transverse Ranges.

## **JP**

### **JEFFREY PINE ALLIANCE**

Pure conifer and mixed conifer and hardwood Jeffrey Pine (Pinus jeffreyi) stands occur in the Mountains Section in the Transverse and Peninsular Ranges. Mapped elevations are generally between 3600 - 9800 ft (1096 - 2986 m), although it is more common in the range 4000 - 9000 ft (1220 - 2742 m). Ponderosa Pine (P. ponderosa) may form a component of this Alliance and may hybridize with Jeffrey Pine where the ranges overlap. This type is often found with significant hardwood components but without an understory of semi-desert shrubs, although Eastside Pine stands may be adjacent to it at its northernmost extent. Black Oak (Quercus kelloggii) is the most frequent hardwood associate, generally being in the elevation range 4000 - 7600 ft (1220 - 2316 m) in this area and often on low gradient slopes. Canyon Live Oak (Quercus chrysolepis) is also a common hardwood component of these stands, but more often on moderate to steep slopes. Coast Live Oak (Q. agrifolia) is more likely to be found in the southernmost extent of this Alliance and on low gradient slopes. Common shrub associates include Manzanita species (Arctostaphylos spp.), Mountain Whitethorn (Ceanothus cordulatus), Deerbrush (Ceanothus integerrimus), and Bush Chinquapin (Chrysolepis sempervirens).

## **JT**

### **CALIFORNIA JUNIPER (TREE)**

The tree form of California Juniper (Juniperus californica) in southern California has been mapped only sparsely in the Northern Transverse Ranges Subsection of the Mountains Section at mid elevations, about 3100 – 4400 ft (945 – 1342 m). It is found in close proximity to other xeric species such as the shrub form of this species, Singleleaf Pinyon Pine (Pinus monophylla), California Buckwheat (Eriogonum fasciculatum) as well as being adjacent to the Annual Grasses and Forbs Alliance.

## **JU**

### **UTAH JUNIPER ALLIANCE**

Utah Juniper (Juniperus osteosperma) has been mapped very sparingly as a dominant conifer in this province, being much more common within desert environments to the east. The alliance has been identified in the northeastern area of the Little San Bernardino - Bighorn Mountains Subsection of the Mountains Section at an elevation range of 4200 – 5000 ft (1280 – 1646 m). Utah Juniper associates with Joshua Tree (Yucca brevifolia), California Juniper (Juniperus californica), Singleleaf Pinyon Pine (Pinus monophylla), and Blackbush (Coleogyne ramosissima) in this region.

## **KP**

### **KNOBCONE PINE ALLIANCE**

Knobcone Pine (Pinus attenuata) reaches its southernmost extent in the United States in the Santa Ana Mountains and is the dominant conifer in this alliance. It has been mapped sparsely in the San Gorgonio Subsection of the Mountains Section of this zone at elevation ranges from about 2400 – 5400 ft (732 – 1646 m). It also is known to occur (but has not yet been mapped) in a region of metamorphosed volcanic soils in the Santa Ana Mountains Subsection, and generally on shallow or coarse granitic soils in the San Bernardino Mountains. This closed-cone conifer is occasionally found with a Canyon Live Oak (Quercus chrysolepis) hardwood associate, with conifers such as Bigcone Douglas-fir (Pseudotsuga macrocarpa) or Coulter Pine (P. coulteri) and with shrubs such as Ceanothus spp., Eastwood Manzanita (Arctostaphylos glandulosa), Chamise (Adenostoma fasciculatum) and shrubby Oaks (Quercus spp.).

## **LP**

### **LODGEPOLE PINE ALLIANCE**

This alliance occurs very sparsely at high elevations in the San Bernardino Mountains and has patchy occurrences in the San Jacinto Mountains. Most often found on low-gradient slopes, especially those adjacent to mountain meadows, sites dominated by Lodgepole Pine (Pinus contorta ssp. murrayana) have been mapped in the elevation range 8400 – 9200 ft (2562 – 2806 m). Sites are often east and north facing and have minor components of White Fir (Abies concolor) or Sugar Pine (Pinus lambertiana). On high windswept peaks, Lodgepole Pine associates with Limber Pine (Pinus flexilis) in the Subalpine Conifers Alliance.

## MC

### CUYAMACA CYPRESS ALLIANCE

Cuyamaca Cypress (Cupressus arizonica var. stephensonii, also called Callitropsis stephensonii), the rarest cypress in California, occurs in relict stands in the vicinity of Japacha Peak in the Palomar –Cuyamaca Peak Subsection of the Mountain Section in San Diego County. Sites are at mapped elevations of about 4400 – 5600 ft (1342 – 1708 m), in an area of relatively high precipitation for southern California and on gabbro (clayey) soils. Slopes are usually moderately steep and south facing. Fire history determines potential survival of this closed-cone cypress, since it is subject to devastating chaparral fires. Chaparral shrub associates include Chamise (Adenostoma fasciculatum), Eastwood Manzanita (Arctostaphylos glandulosa), and Cupleaf Ceanothus (Ceanothus greggii var. perplexans). The more protected riparian sites contain hardwood associates such as Coast Live Oak (Quercus agrifolia) as well as shrubs such as California Wild Rose (Rosa californica) and Spreading Snowberry (Symphoricarpos mollis).

## MF

### MIXED CONIFER - FIR ALLIANCE

This alliance is abundantly found in the Upper San Gabriel Mountains, Upper San Gorgonio Mountains, and San Jacinto Mountains Subsections and less frequently in seven others of the Mountains Section in the elevation range 5400 - 9400 ft (1646 - 2864 m), about 1000 ft (304 m) higher than the Mixed Conifer-Pine Alliance where they occur in the same areas. Sites are mainly north facing and steep. They may be as low as 4200 ft (1280 m) in the southern areas and as high as 10,000 ft (3048 m) elsewhere. True fir, usually White Fir (Abies concolor), comprises a prominent portion of the conifer canopy cover. Jeffrey Pine (Pinus jeffreyi) is generally present in this Alliance but may be replaced by Lodgepole Pine (Pinus contorta ssp. murrayana) on some sites. The combination of species may include Sugar (Pinus lambertiana) and Coulter (Pinus coulteri) Pines in addition to Incense Cedar (Calocedrus decurrens) and those mentioned above. Black Oak (Quercus kelloggii) is the main hardwood associate in the southern Peninsular Ranges, more likely to occur on moderately steep slopes. Canyon Live Oak (Quercus chrysolepis) is a more common associate in the San Jacinto Mountains and both species in the San Bernardino and San Gabriel Mountains. White Alder (Alnus rhombifolia) and species of Willow (Salix spp.) may occasionally occur in moist sites of this Alliance.

## MP

### MIXED CONIFER - PINE ALLIANCE

This Alliance occurs throughout the Transverse and Peninsular Ranges in ten subsections of the Mountains Section on mid to high montane sites, commonly within the elevation range 4000 – 8800 ft (1220 – 2684 m) and often below the Mixed Conifer - Fir Alliance. Slopes are often north facing and steep in stands lacking a prominent hardwood species. No single conifer species is dominant, the mixture usually including much Ponderosa Pine (Pinus ponderosa) or Sugar Pine (P. lambertiana), particularly at the lower elevations. Incense Cedar (Calocedrus decurrens), Bigcone Douglas-fir (Pseudotsuga macrocarpa), White Fir (Abies concolor), and Coulter Pine (P. coulteri) often are present in various combinations. Jeffrey Pine (P. jeffreyi) and Lodgepole Pine (P. contorta ssp. murrayana) are generally absent. Black Oak (Quercus kelloggii) or Canyon Live Oak (Q. chrysolepis) occurs frequently in mixed stands, Canyon Live Oak having a slightly wider elevation range in this Alliance. Other minor hardwood components include Bigleaf Maple (Acer macrophyllum), White Alder (Alnus rhombifolia), and Willow (Salix spp.) on moist sites.

## MT

### TECATE CYPRESS ALLIANCE

Stands of dominant Tecate Cypress (Cupressus forbesii, also called Callitropsis forbesii), a species of conservation concern, have been mapped in scattered locations of southern California at elevations below 4900 ft (1494 m) in both the Coast (Coastal Hills Subsection) and Mountains (Western Granitic Foothills Subsection) Sections. The Alliance is more common within the range 1000 - 3000 ft (304 - 914 m) and on north facing, moderate to steep slopes. It has been mapped on Guatay Mountain in San Diego County in an area of gabbroic (clay-rich) soils and mixed chaparral vegetation and elsewhere in the county, such as on Otay Mountain. Shrub associates in this area include Eastwood Manzanita (Arctostaphylos glandulosa), Chamise (Adenostoma fasciculatum), Birchleaf Mountain Mahogany (Cercocarpus betuloides), and Cupleaf Ceanothus (Ceanothus greggii var. perplexans) in addition to herbaceous plants such as Broom Snakeweed (Gutierrezia sarothrae) and Common Goldenstar (Bloomeria crocea).

## PC

### COULTER PINE ALLIANCE

Sites dominated by Coulter Pine (Pinus coulteri), a relatively short-lived conifer, occur as open forests or woodlands throughout montane and coastal areas of central and southern California. Elevations of this alliance have been mapped at frequencies from sparse to abundant in thirteen subsections of this zone at elevations from about 1000 - 7000 ft (305 - 2134 m).

Occupying somewhat drier and more fire-prone sites than those of Bigcone Douglas-fir (*Pseudotsuga macrocarpa*), Coulter Pine has a variable expression of cone serotiny. The closed-cone habit is to some extent related to the elevation and geographic niches this species occupies. For example, stands with fully developed serotinous cones often have a chaparral understory represented by species such as Mountain Whitethorn (*Ceanothus cordulatus*), Manzanitas (*Arctostaphylos* spp.), Chamise (*Adenostoma fasciculatum*) and shrub Interior and Canyon Live Oaks (*Quercus wislizenii* var. *frutescens*, *Q. chrysolepis* var. *nana*). Cones that open over a period of years in uneven-aged stands may be adjacent to woodland environments occupied by Coast Live Oaks (*Q. agrifolia*) and tree Canyon Live Oaks with the addition of California Black Oaks (*Q. kelloggii*) in the Mountains Section. Conifer associates in different areas include Ponderosa Pine (*P. ponderosa*), Bigcone Douglas-fir, and Jeffrey Pine (*P. jeffreyi*). Soils tend to be shallow and well drained. These trees are subject to various stresses, especially in areas of prolonged drought, where bark beetles have killed many of these pines within the last two decades.

## **PD**

### **GRAY PINE ALLIANCE**

Gray Pine (*Pinus sabiniana*) reaches its southernmost extent in Santa Barbara County and northwestern areas of Los Angeles County close to the San Joaquin Valley. It forms the dominant, and frequently only, conifer in this alliance. In the Santa Ynez Valleys and Hills Subsection of the Coast Section, this type has been mapped sparsely in the elevation range of about 1200 – 4200 ft (366 – 1280 m), and occasionally in the San Rafael-Topatopa Mountains and Northern Transverse Ranges Subsections of the Mountains Section at approximately 1000 – 5000 ft (305 -1524 m). The alliance is usually an open woodland type with a diverse mixture of trees such as Canyon Live Oak (*Quercus chrysolepis*), Bigcone Douglas-fir (*Pseudotsuga macrocarpa*) and shrubs such as Chamise (*Adenostoma fasciculatum*), California Buckwheat (*Eriogonum fasciculatum*) and Rabbitbrush (*Chrysothamnus* spp.).

## **PE**

### **SUGAR PINE ALLIANCE**

Sugar Pine (*Pinus lambertiana*) is one of the conifers associated with the Mixed Conifer – Pine Alliance across California. Occasionally it dominates small areas of mid-elevation slopes in this zone, being mapped sparsely in the San Rafael–Topatopa Mountains and Northern Transverse Subsections of the Mountains Section. These stands were mapped at elevations between 5400 – 6800 ft (1646 – 2074 m) and generally on moist or north-facing slopes with a history of logging or other disturbance that allow Sugar Pine's abundant seedlings to repopulate these favorable sites.

## **PJ**

### **SINGLELEAF PINYON PINE ALLIANCE**

Singleleaf Pinyon Pine (*Pinus monophylla*) dominates much of the mapped acreage in semi-arid areas in the Mountains Section. This open woodland alliance occurs most frequently in the elevation range 3000 – 9000 ft (915 – 2745 m) in transmontane regions such as northern areas of the Transverse Ranges and eastern areas of the Peninsular Ranges adjacent to the Mojave and Colorado Deserts. It is especially abundant in the Northern Transverse Ranges, San Gabriel Mountains and Little San Bernardino-Bighorn Mountains Subsections. Understories are diverse and may include the shrubs Big Sagebrush (*Artemisia tridentata*), Tucker or Muller Oak (*Quercus john-tuckeri*, *Quercus cornelius-mulleri*), Curlleaf Mountain Mahogany (*Cercocarpus ledifolius*), Boxthorn (*Lycium* spp.), and Desert Bitterbrush (*Purshia tridentata*). The shrub California Juniper (*Juniperus californica*) occupies sites in this type at lower elevations and often on gentle slopes or alluvium. Small trees such as Utah Juniper (*Juniperus osteosperma*) and Joshua Tree (*Yucca brevifolia*) may also occur in this Alliance.

## **PL**

### **LIMBER PINE ALLIANCE**

Limber Pine (*Pinus flexilis*), a high montane conifer of often remote locations, has a wide-ranging distribution from British Columbia and Alberta east through the Rocky Mountains to South Dakota and south to high peaks of southern California. In this zone, it occurs in scattered open stands or as individual trees above the White Fir (*Abies concolor*) range in southern California. It seldom occurs below 8000 ft (2438 m), appearing occasionally on the highest desert facing slopes of the Santa Rosa and San Jacinto Mountains (Mt. San Jacinto Peak) as well as higher areas of the San Gabriel and San Bernardino Mountains, such as on Mt. Baden-Powell and San Geronio Mountain. The trees are rarely over 30 ft (10 m) tall and may form very scattered, low krummholz or wind-trained forms at timberline. Slopes are typically high gradient and north facing. Conifers such as Lodgepole Pine (*Pinus contorta* ssp. *murrayana*) and White Fir intermix with Limber Pine. The understory is typically very sparse, occasionally including Mountain Whitethorn (*Ceanothus cordulatus*) or species of Manzanita (*Arctostaphylos* spp.).

## PM

### BISHOP PINE ALLIANCE

Bishop Pine (*Pinus muricata*), a closed-cone pine, can be found along the coast in disjunct populations from Humboldt to Santa Barbara Counties, as well as in the Channel Islands of Santa Rosa and Santa Cruz Islands and in Mexico. It also occurs in the Santa Ynez Mountains of Santa Barbara County, being closely related to Monterey Pine (*Pinus radiata*) and Santa Cruz Island Pine (*Pinus remorata*). Bishop Pine is short-lived, typically found in even-aged stands due to its regeneration after fires, and tolerates shallow, poorly drained, acidic soils. Fog drip is important for its maintenance during the summer months. The Bishop Pine Alliance, in which it is dominant, occasionally has a Coast Live Oak (*Quercus agrifolia*) hardwood associate and a subshrub understory of coastal sage species such as California Sagebrush (*Artemisia californica*).

## PP

### PONDEROSA PINE ALLIANCE

Ponderosa Pine (*Pinus ponderosa*), a highly valued timber tree in most western and southwestern states, has a wide geographical range from British Columbia to Mexico, east to the Great Plains and Texas. Three varieties are recognized, the westernmost being *P. p.* var. *ponderosa* in California. Scattered pure conifer and mixed conifer/hardwood stands have been mapped sparsely in interior locations of the San Bernardino and San Gabriel Mountains (San Jacinto Foothills – Cahuilla Mountains, San Jacinto Mountains and Palomar – Cuyamaca Peak Subsections) in the Mountains Section. Sites have been mapped in the elevation range 3400 - 7000 ft (1036 - 2134 m), more commonly between about 4400 – 6400 ft (1340 – 1950 m). The alliance intergrades with the Mixed Conifer – Pine Alliance on more productive sites, especially at its upper elevations. California Black and Canyon Live Oaks (*Quercus kelloggii*, *Q. chrysolepis*) occur most consistently as hardwood components in mixed stands. Ponderosa Pine may hybridize with Jeffrey Pine (*Pinus jeffreyi*) in the upper part of its elevation range where the two ranges overlap to form individuals with intermediate diagnostic characteristics.

## PQ

### FOURNEEDLE PINYON PINE ALLIANCE

Fourneedle (or Parry) Pinyon Pine (*Pinus quadrifolia*) is a long-lived, slow-growing semi-desert pine that is the most widespread conifer in northern Baja California. It has a restricted range (southern California to Baja) and may hybridize with the more abundant Singleleaf Pinyon Pine (*P. monophylla*) in areas of species overlap. As a dominant conifer, small dense stands of Fourneedle Pinyon Pine have been mapped in the Peninsular Ranges in the Mountains Section on slopes near Thomas Mountain (Riverside County) and very sparsely near Anza Borrego Desert State Park (San Diego County). They often occupy north-facing drainages of semiarid desert transition zones. Typical sites have scattered or clumped individuals emergent through relatively dense brushfields. Mapped elevations are from about 4000 – 5800 (1220 – 1768 m). Associated species include Chamise (*Adenostoma fasciculatum*), Red Shank (*Adenostoma sparsifolium*), California Juniper (*Juniperus californica*), Curlleaf Mountain Mahogany (*Cercocarpus ledifolius*), and Jeffrey Pine (*Pinus jeffreyi*).

## PT

### TORREY PINE ALLIANCE

Torrey Pine (*Pinus torreyana*), the rarest North American native pine, exists in two relict stands remaining from a pre-Pleistocene distribution (of its nearest ancestor) that ranged up to present-day Oregon. On the California mainland, it is represented as subspecies *torreyana* in San Diego County adjacent to the coast near Del Mar (Torrey Pine State Park). Off the mainland, its other stand is identified as subspecies *insularis* on a coastal strip of Santa Rosa Island (Santa Barbara County). As mapped in the Coastal Terraces Subsection of the Coast Section, Torrey Pine dominates the tree component of this alliance on low, eroding coastal bluffs and ravines in a dry fog belt zone below 200 ft (60 m). Associated chaparral species include Chamise (*Adenostoma fasciculatum*) and Toyon (*Heteromeles arbutifolia*). The coastal sage scrub and coastal bluff communities are represented in these stands by Black Sage (*Salvia mellifera*), California Sagebrush (*Artemisia californica*), California Encelia or Brittlebush (*Encelia californica*), Lemonade berry (*Rhus integrifolia*), Coastal Prickly Pear (*Opuntia littoralis*) and Bladderpod (*Isomeris arborea*). Rarer species occurring here include Nuttall's Scrub Oak (*Quercus dumosa*), Wart-stemmed Ceanothus (*C. verrucosus*), San Diego Mountain Mahogany (*Cercocarpus minutiflorus*) and disjunct populations of Mojave Yucca (*Y. schidigera*). The state park that protects Torrey Pine is adjacent to brackish waters of the Pickleweed – Cord Grass Alliance.

## SA

### SUBALPINE CONIFERS ALLIANCE

This type is a mixed Lodgepole Pine (*Pinus contorta* ssp. *murrayana*) - Limber Pine (*Pinus flexilis*) - Mountain Juniper (*Juniperus occidentalis* var. *australis*, also called *J. grandis*) open forest that occurs at the higher elevations of the Transverse and San Jacinto Mountains in the Mountains Section. Usually occurring above about 7000 ft (2134 m), on steep and often north-facing slopes, the Subalpine Conifers Alliance may be found as high as 11,000 ft (4060 m) or to the extent of local

timberline. Limber Pine is most important on exposed high slopes and ridges, where it may form small areas of pure stands in the Limber Pine Alliance. Lodgepole Pine becomes locally abundant on similar dry sites. White Fir (*Abies concolor*) may be present in small amounts in this mixture. This alliance is defined by the lack of clear dominance of a single conifer on these sites.

## **WF**

### **WHITE FIR ALLIANCE**

White Fir (*Abies concolor*) is considered to be a taxonomic complex of similar taxa, including the California White Fir named by some as a separate variety (var. *lowiana*). This common species occurs from Oregon south to Baja California and east to Colorado and New Mexico in montane forests, becoming the dominant conifer of its alliance. The White Fir Alliance has been mapped throughout the Transverse and Peninsular Ranges within eight subsections in the Mountains Section. These sites typically occur within an elevation range of about 5000 – 9000 ft (1524 - 2745 m) often on mesic or shaded slopes. White Fir readily mixes with its most frequent hardwood associate Black Oak (*Quercus kelloggii*), at lower elevations, below about 5600 ft (1706 m) or so, especially in the San Jacinto Mountains area of Riverside County. It associates less commonly with Canyon Live Oak (*Quercus chrysolepis*) up to about 7000 ft (2134 m), with Sugar Pine (*Pinus lambertiana*) on sunnier sites and with Coulter Pine (*Pinus coulteri*) at lower elevations. The White Fir Alliance is much less common in southern California than the Mixed Conifer - Fir Alliance, which is found within the same general regions and elevations, but which usually occupies steeper slopes.

## **WJ**

### **WESTERN or MOUNTAIN JUNIPER ALLIANCE**

The Western Juniper (*Juniperus occidentalis*) complex of two varieties or species occurs from southern Washington to eastern Idaho and south to southern California. It is a long-lived, slow growing conifer of harsh sites that are often nutrient-poor but which may support a subterranean water source such as a perched water table. Mountain Juniper (*Juniperus occidentalis* var. *australis*), the southern variety of Western Juniper (*J. o.* var. *occidentalis*) has recently been renamed as its own species (*J. grandis*) as determined from DNA comparisons of the two varieties. More common in the Sierra Nevada Mountains, this taxon occurs infrequently in this zone as a tree of dry, rocky subalpine slopes. It occasionally will dominate the tree component of a site, and has been mapped sparsely in the San Bernardino Mountains (San Gorgonio Mountains and Upper San Gorgonio Mountains Subsections) of the Mountains Section at elevations between 6600 – 9400 ft (2012 – 2867 m). White Fir (*Abies concolor*), Limber Pine (*Pinus flexilis*), and Singleleaf Pinyon Pine (*Pinus monophylla*) may occur within or adjacent to Mountain Juniper sites in this area.

## **HARDWOOD FOREST / WOODLAND**

## **EX**

### **COASTAL MIXED HARDWOOD ALLIANCE**

This alliance of mixed hardwoods has no single dominant species but has an abundance of Coast Live Oak (*Quercus agrifolia*) in the mixture. These sites are very often adjacent to and include portions of mesic Black Walnut (*Juglans californica*) individuals in addition to minor proportions of other oaks. Lower elevation shrubs such as California Sagebrush (*Artemisia californica*) Lemonade berry (*Rhus integrifolia*), Laurel Sumac (*Malosma laurina*) and components of the Lower Montane Mixed Chaparral Alliance such as various species of *Ceanothus*, Toyon (*Heteromeles arbutifolia*) and Chamise (*Adenostoma fasciculatum*) are also spatially associated with this alliance. The Coastal Mixed Hardwood Alliance has been mapped widely but sporadically in this zone, occurring in five subsections of the Coast Section and seven in the Mountains Section at elevations generally less than about 3600 ft (1098 m).

## **FM**

### **CURLLEAF MOUNTAIN MAHOGANY ALLIANCE**

The tree form of Curlleaf Mountain Mahogany (*Cercocarpus ledifolius*) is the dominant hardwood of this alliance on dry and mostly rocky sites. This type has been mapped only rarely in the San Gorgonio Mountains and Upper San Gorgonio Mountains Subsections of the Mountains Section on xeric, upper montane elevation areas between about 6400 – 9200 ft (1952 – 2806 m). Singleleaf Pinyon Pine (*Pinus monophylla*) and Jeffrey Pine (*P. jeffreyi*) are often associated with this type. This species may live several hundred years or more in fire-resistant environments. Although shrub forms occur more commonly in this zone, the arborescent form may develop in areas having less intense fire regimes that allow mature individuals to grow into large, single-trunked specimens in old stands. Its value in providing good quality forage and winter cover for browsing animals is appreciated.

## NR

### RIPARIAN MIXED HARDWOOD ALLIANCE

Most perennially flowing streamside sites in southern California are not occupied by a single dominant hardwood species, but rather a mixture of deciduous trees and shrubs whose composition changes along the stream length. In this area, the Riparian Mixed Hardwood Alliance has been mapped widely in all subsections of the Mountains Section and in eight of the ten subsections of the Coast Section from Santa Barbara to San Diego Counties. Elevations are typically below 6000 ft (1830 m). The species mixture includes any combination of native obligate or facultative riparian hardwoods such as White Alder (*Alnus rhombifolia*), Willow (*Salix* spp.), California Sycamore (*Platanus racemosa*), Fremont or Black Cottonwood (*Populus fremontii*, *P. balsamifera* ssp. *trichocarpa*), Bigleaf Maple (*Acer macrophyllum*), Coast Live Oak (*Quercus agrifolia*), California Bay (*Umbellularia californica*), and Dogwood (*Cornus* spp.). A variety of riparian shrubs and perennial species may be included in this Alliance, such as California Wildrose (*Rosa californica*), Mugwort (*Artemisia douglasiana*), *Baccharis* spp., *Rubus* spp., *Ribes* spp., etc.

## NX

### INTERIOR MIXED HARDWOOD ALLIANCE

Mixtures of hardwood species in upland areas have been mapped sparsely in two subsections of the Coast Section at elevations below about 3800 ft (1158 m) and more frequently in ten subsections of the Mountains Section up to about 6000 ft (1830 m). No single species is dominant, the combination of species being variable between regions. Species include various mixtures of prominent Canyon and Interior Live Oaks (*Quercus chrysolepis*, *Q. wislizenii*), and Valley Oak (*Q. lobata*), with minor amounts of Black Oak (*Q. kelloggii*), Blue Oak (*Q. douglasii*), and/or Engelmann Oak (*Q. engelmannii*). Coast Live Oak (*Q. agrifolia*), Bigleaf Maple (*Acer macrophyllum*), and/or California Bay (*Umbellularia californica*) are sometimes associated with this Alliance in moist riparian environments. Conifers such as Bigcone Douglas-fir (*Pseudotsuga macrocarpa*) and Coulter Pine (*Pinus coulteri*) occasionally are present in upland sites adjacent to or within this alliance in the Mountains Section.

## QA

### COAST LIVE OAK ALLIANCE

Coast Live Oak (*Quercus agrifolia*) is considered to be the most fire-resistant California tree oak, because of its evergreen leaves, thick bark and ability to sprout from the trunk and roots from food reserves stored in an extensive root system. Two varieties are recognized: var. *oxyadenia*, occurring in the upper part of its elevation range in the Peninsular Ranges and Baja California and var. *agrifolia* at lower elevations elsewhere in this zone. It is abundant in southern and central California in coastal valleys and lower slopes of montane areas. As a dominant hardwood, this oak has been mapped throughout the Transverse, Peninsular, and South Coast Ranges at elevations from near sea level in the Coast Section to about 5000 ft (1524 m) in the Mountains Section within twenty-two subsections. These stands vary from open savanna-like grasslands in interior sites to dense forests, depending on site conditions such as climate, lithology, and slope angle. It also is a significant component of the Coastal Mixed Hardwood Alliance in combination with others such as Canyon Live Oak (*Q. chrysolepis*). Coast Live Oak stands intergrade with *Ceanothus* dominated chaparral in the Santa Ynez Mountains (Santa Barbara County). In the southern portions of the San Gabriel Mountains (Los Angeles County) this hardwood may be present with species in the California Sagebrush and Lower Montane Mixed Chaparral Alliances such as California Sagebrush (*Artemisia californica*), Sages (*Salvia* spp.), California Buckwheat (*Eriogonum fasciculatum*), Chamise (*Adenostoma fasciculatum*), and species of *Rhus*, *Malosma*, etc. In the southern Peninsular Ranges of San Diego County, Coast Live Oak sites may also include dry grasslands, Engelmann Oak (*Q. engelmannii*) and Lower Montane Mixed Chaparral species.

## QB

### CALIFORNIA BAY ALLIANCE

California Bay (*Umbellularia californica*), an adaptable evergreen hardwood, occurs in canyons, shaded slopes, and moist sites in chaparral and woodland communities throughout much of California. It occasionally forms scattered small stands as a tree in more protected environments when it becomes a dominant hardwood in this alliance. It also may take a more shrub-like form in exposed places and in the chaparral. The alliance has been mapped occasionally in southern California, most notably in the San Gabriel Mountains Subsection of the Mountains Section, and also in five other subsections of this section at elevations below about 5000 ft (1524 m). Coast and Canyon Live Oaks (*Quercus agrifolia*, *Q. chrysolepis*) are the most frequent hardwood associates, with Chamise (*Adenostoma fasciculatum*), species of *Ceanothus*, shrub Canyon Live, and shrub Interior Live Oaks (*Q. chrysolepis* var. *nana*, *Q. wislizenii* var. *frutescens*) being the more common shrub associates in this type.

## QC

### CANYON LIVE OAK ALLIANCE

Canyon Live Oak (*Quercus chrysolepis*), a long-lived, evergreen hardwood, is the most widely distributed California oak, growing from southwestern Oregon into Baja California and east as relict stands into Nevada and Arizona. It forms extensive pure stands throughout southern California as a tree and shrubby species on steep and often rocky canyon and mountain slopes. Its sprouting ability allows it to persist in fire-prone areas. This alliance has been mapped very abundantly or occasionally in fifteen subsections of the Mountains Section at elevations up to about 8500 ft (2593 m) and sparsely in four subsections of the Coast Section up to about 4400 ft (1342 m). The geographic distribution in this zone is also wide-ranging, enabling an association with Bigcone Douglas-fir (*Pseudotsuga macrocarpa*) in canyon bottoms and with Coulter Pine (*Pinus coulteri*) on gentle slopes or more xeric sites and with Singleleaf Pinyon Pine (*P. monophylla*) in transmontane semi-arid areas. Other conifer associates include Knobcone, Ponderosa, Jeffrey or Gray Pines (*P. attenuata*, *P. ponderosa*, *P. jeffreyi*, *P. sabiniana*), and White Fir (*Abies concolor*). In sheltered slopes and in mesic ravines closer to the coast, its hardwood associates include Madrone (*Arbutus menziesii*) and California Bay (*Umbellularia californica*), especially in Santa Barbara County. This oak often associates with Coast Live (*Q. agrifolia*) and Blue (*Q. douglasii*) Oaks in the Interior Mixed Hardwood Alliance, with tree and shrub forms of Interior Live Oak (*Q. wislizenii*), especially in the Transverse Ranges, and with Black Oak (*Q. kelloggii*) in the Peninsular Ranges. Deerbrush (*Ceanothus integerrimus*), Chaparral Whitethorn Ceanothus (*C. leucodermis*), Birchleaf Mountain Mahogany (*Cercocarpus betuloides*), Poison Oak (*Toxicodendron diversilobum*), and Manzanita (*Arctostaphylos* spp.) are common chaparral shrub associates.

## QD

### BLUE OAK ALLIANCE

Blue Oak (*Quercus douglasii*) is a drought-tolerant, deciduous hardwood that is endemic to California. It forms open woodlands on well-drained soils in low elevation sites throughout interior California, reaching its southernmost extent in this zone and eastward to Santa Cruz and Santa Catalina Islands in the Channel Islands. Blue Oak forms conspicuous semi-deciduous hybrids known as Alvord Oak (*Q. xalvordiana*) with the shrub Tucker Oak (*Q. john-tuckeri*).

As a pure dominant type, Blue Oak stands have been mapped sparsely in six subsections here at elevations typically in the range 600 – 4000 ft (183 – 1220 m) in both sections. Species that commonly are found in minor amounts on these sites include Coast Live Oak (*Q. agrifolia*), California Sagebrush (*Artemisia californica*) and California Buckwheat (*Eriogonum fasciculatum*) in addition to an herbaceous understory of annual grasses and forbs. Populations of this oak are in decline across many areas due to multiple factors, especially habitat loss from urban or rural development projects, competition from non-native grasses and forbs, drought, fire, and acorn predation and browsing on seedlings by ungulates, rodents and domestic livestock.

## QE

### WHITE ALDER ALLIANCE

White Alder (*Alnus rhombifolia*) is a short-lived, shade-intolerant deciduous riparian tree or large shrub. It has been mapped in scattered pure or nearly pure stands in the Transverse Ranges in six subsections of the Mountains Section and at one site in the Coast Section. Elevations are in the range 300 – 7000 ft (92 – 2135 m). Riparian species such as Fremont Cottonwood (*Populus fremontii*) and Willows (*Salix* spp.) are common tree associates.

## QF

### FREMONT COTTONWOOD ALLIANCE

Fremont Cottonwood (*Populus fremontii*) is a relatively long-lived, deciduous riparian tree which germinates best on newly exposed moist alluvium such as stream gravel beds. As a hardwood dominating this alliance, it has been mapped in scattered sites within twenty-one subsections of both sections in the Transverse and Peninsular Ranges at elevations below about 5600 ft (1706 m). Along with other associated trees such as California Sycamore (*Platanus racemosa*), White Alder (*Alnus rhombifolia*), Coast Live Oak (*Quercus agrifolia*), and Willows (*Salix* spp.), Fremont Cottonwood becomes a major component of the Riparian Mixed Hardwood Alliance.

## QI

### CALIFORNIA BUCKEYE ALLIANCE

California Buckeye (*Aesculus californica*), a deciduous and adaptable endemic hardwood, is mostly found on coarse-textured soils in low-elevation areas from Siskiyou to Los Angeles Counties and east to the Sierra foothills and the Mojave Desert. It is rarely found in pure stands in this zone but has been mapped very sparsely as such near the Tehachapi Mountains in the Northern Transverse Ranges Subsection of the Mountains Section. These sites are usually on north-facing, often steep, slopes at elevations between about 3900 – 4500 ft (1190 – 1373 m). Compared to surrounding sites, these canyons are relatively



moist. Canyon Live Oak (*Quercus chrysolepis*), Scrub Oaks (*Quercus* spp.) and shrubs of lower elevation such as Birchleaf Mountain Mahogany (*Cercocarpus betuloides*) are sometimes associated with these sites.

## **QK BLACK OAK ALLIANCE**

California Black Oak (*Quercus kelloggii*), a long-lived, deciduous upland tree, is the most important hardwood timber species in California. It is very common in mixed conifer and hardwood stands in association with Jeffrey, Ponderosa, and Coulter Pines (*Pinus jeffreyi*, *P. ponderosa*, *P. coulteri*), White Fir (*Abies concolor*), and Bigcone Douglas-fir (*Pseudotsuga macrocarpa*). As a dominant in hardwood stands with minor or no conifer overstory, California Black Oak has been mapped on mesic slopes at mid-montane elevations from about 3200 – 7600 ft (976 – 2318 m) in the Mountains Section. This alliance is prominent in the San Gorgonio Mountains, Upper San Gorgonio Mountains and Palomar – Cuyamaca Peak Subsections and occasionally occurs in eight other subsections in the Peninsular and Transverse Ranges. These stands often develop as a result of intensive fires or other disturbance such as logging of conifers, varying greatly in canopy closure from very dense to savanna-like. Canyon Live Oak (*Q. chrysolepis*) is the main hardwood associate in pure stands and with this oak in the Montane Mixed Hardwood Alliance.

## **QL VALLEY OAK ALLIANCE**

Valley Oak (*Quercus lobata*) is a large, winter-deciduous endemic tree with a round, spreading canopy, supported by (often) massive limbs and a thick bark and bole in maturity. It reaches its southernmost extent in western Los Angeles County in association with dry grasslands in open woodlands and also reaches the Channel Islands. Similar to the Blue Oak Alliance, the Valley Oak Alliance also occurs in savannas within the Santa Ynez Mountains as well as in valleys near Oak Ridge (Ventura and Los Angeles Counties). It is often found on alluvial or other sites that may retain more summer moisture than Blue Oak woodlands but its maintenance is of conservation concern due to habitat losses and other anthropogenic factors. As a dominant hardwood in this alliance, it has been mapped in scattered stands in southern California in six subsections of the Coast Section at elevations below about 4000 ft (1220 m) on low to moderate gradient slopes. The alliance has also been identified in the Mountains Section within the San Rafael – Topatopa Mountains and Northern Transverse Ranges Subsections in the elevation range of about 1000 – 4600 ft (305 – 1402 m). Associated trees in southern California include Gray Pine (*Pinus sabiniana*) and Coast Live Oak (*Q. agrifolia*).

## **QM BIGLEAF MAPLE ALLIANCE**

Scattered patches of Bigleaf Maple (*Acer macrophyllum*) have been mapped as dominants of this understory alliance within the San Gorgonio and Upper San Gorgonio Mountains Subsections of the Southern California Mountains and Valleys Section. The maple associates with upland trees such as Black Oak (*Quercus kelloggii*), Ponderosa Pine (*Pinus ponderosa*), and White Fir (*Abies concolor*), as well as riparian or mesic trees and shrubs such as Dogwood (*Cornus* spp.), California Bay (*Umbellularia californica*), and Roses (*Rosa* spp.). This Alliance has been mapped within the elevation range 4494 - 5700 ft (1370 - 1738 m).

## **QN ENGELMANN OAK ALLIANCE**

Engelmann Oak (*Quercus engelmannii*), a medium-sized, drought-deciduous to evergreen endemic tree, formerly had a relatively wide distribution throughout southeastern California, Arizona and Baja California prior to the formation of modern deserts in those areas. Taxonomically related to oaks towards the southeast (Mexican Blue – *Q. oblongifolia* and Arizona - *Q. arizonica* Oaks), Engelmann Oak is now restricted to areas of sufficient rainfall and mild climatic conditions, occurring mainly in open woodlands with a grassland or chaparral understory such as in the Organ Valley Research Natural Area (San Diego County), the Santa Rosa Plateau (Riverside County) and other areas of this zone. As a dominant hardwood in this alliance, Engelmann Oak has been mapped on one site of the Coastal Hills Subsection (Coast Section) and more prominently in the Santa Ana Mountains, Western Granitic Foothills and Palomar – Cuyamaca Peak Subsections (Mountains Section) at elevations generally below about 4200 ft (1280 m). Coast Live Oak (*Q. agrifolia*) is the typical additional hardwood in this alliance as well as understory shrubs and herbaceous species associated with coastal sage scrub, dry annual grasses and forbs and low-elevation chaparral. Having a limited range and subject to several stressors, Engelmann Oak stands apparently are not currently regenerating well and are a subject of conservation concern.

## QO

### WILLOW ALLIANCE

The Willow Alliance is defined by the dominance of any single or combination of tree species of Willow (*Salix* spp.), such as Black (*Salix gooddingii*), Red (*Salix laevigata*), Arroyo (*Salix lasiolepis*), and/or Shining (*Salix lucida*) Willows. It has been mapped along streambanks below 1600 ft (488 m) in the Coast Section and mainly below about 8200 ft (2501 m) in the Mountains Section. Associates may include riparian species such as Fremont Cottonwood (*Populus fremontii*) and California Sycamore (*Platanus racemosa*) and a variety of perennial and annual forbs, including invasive species such as Pampas Grasses (*Cortaderia* spp.). Coast Live Oak (*Quercus agrifolia*) is also commonly associated with this Alliance.

## QP

### CALIFORNIA SYCAMORE ALLIANCE

Riparian areas dominated by California Sycamore (*Platanus racemosa*), a fast-growing deciduous hardwood native to California and northern Baja California, occasionally were mapped in scattered areas of southern California. The California Sycamore Alliance has been identified in seven subsections of the Coast and fourteen subsections of the Mountains Sections at elevations up to about 4500 ft (1373 m). Common associates include Fremont Cottonwood (*Populus fremontii*), Willows (*Salix* spp.), Black Walnut (*Juglans californica*), White Alder (*Alnus rhombifolia*), and Coast Live Oak (*Quercus agrifolia*). California Sycamore sites occasionally are on lower floodplains of more xeric areas and may be adjacent to the Riversidean Alluvial Scrub Alliance in those areas.

## QT

### TANOAK ALLIANCE

Tanoak (*Lithocarpus densiflorus*) is a slow-growing, shade-tolerant evergreen hardwood that is taxonomically related to true Oaks (*Quercus* spp.) and Chinquapins (*Chrysolepis* spp. and the Asian genus *Castanopsis* spp.). It often occupies productive sites of deep, well-drained soils or those of shallower soils on shaded slopes. Widely distributed in coastal regions of northern and central California, Tanoak reaches its northern limits in southern Oregon and its southernmost extent in the Santa Ynez Mountains (Santa Ynez – Sulphur Mountains Subsection) in the Coast Section. It seldom occurs in pure stands in southern California but has been mapped sparsely in this area as a dominant hardwood at elevations below about 2000 ft (610 m). Slopes tend to have north-facing aspects and are moderately steep to steep. The range of Tanoak overlaps with that of Madrone (*Arbutus menziesii*) in this area and further north, and they may occur together in this Alliance. Other associates in southern California include coastal sage scrub species such as Sages (*Salvia* spp.) and California Sagebrush (*Artemisia californica*), hardwoods such as Coast Live Oak (*Q. agrifolia*) and occasionally by Bishop Pine (*Pinus muricata*).

## QV

### BLACK WALNUT ALLIANCE

California Black Walnut (*Juglans californica*), a species endemic to the state, historically occurred in a restricted range of southern California at elevations from 500 to 2500 ft (152 - 762 m). Due to its high value for erosion control, wildlife cover and nutritional needs, it has been planted widely up to about 3600 ft (1096 m) in this area and has been mapped as a dominant hardwood type in limited areas of the Santa Ynez – Sulphur Mountains and Simi Valley – Santa Susana Mountains Subsections of the Coast Section and in the Santa Ana Mountains Subsection of the Mountains Section. It also occurs in scattered areas of six other subsections of this zone. Walnuts are usually widely spaced and have various associates, including Coast Live Oak (*Quercus agrifolia*), California Bay (*Umbellularia californica*), Foothill Ash (*Fraxinus dipetala*), Mexican Elderberry (*Sambucus mexicana*), Sugar Bush (*Rhus ovata*), and Skunkbush (*Rhus trilobata*). Sites are usually mesic to moist such as north slopes, creek beds, seeps, canyon bottoms, and alluvial terraces with deep soils. Coastal sage scrub species such as California Sagebrush (*Artemisia californica*) and Black Sage (*Salvia mellifera*) also readily are found on Black Walnut sites.

## QW

### INTERIOR LIVE OAK ALLIANCE

Interior Live Oak (*Quercus wislizenii*), a relatively long-lived, slow-growing evergreen hardwood, is distributed in mesic areas from Siskiyou County to Baja California. In this zone, it occurs as a dominant hardwood in this alliance throughout interior valleys, slopes and foothills of the Transverse and Peninsular Ranges in eight subsections of the Mountains Section. It forms pure stands infrequently at low to intermediate elevations, especially in the San Bernardino Mountains from about 2000 - 6000 ft (610 - 1828 m) with a preference for sites with north-facing slopes. Its chaparral associates include Chaparral Whitethorn (*Ceanothus leucodermis*), Chamise (*Adenostoma fasciculatum*), Scrub Oaks (*Quercus* spp.), and Honeysuckle (*Lonicera* spp.).

## **QX**

### **BLACK COTTONWOOD ALLIANCE**

Black Cottonwood (Populus balsamifera ssp. trichocarpa), a shade intolerant deciduous species with a wide distribution in western North America, is maintained in riparian areas that are frequently flooded. As the dominant hardwood of this alliance, it has been mapped very sparsely in the San Rafael – Topatopa Mountains and Upper San Gorgonio Mountains Subsections of the Mountains Section at elevations up to around 8000 ft (2440 m). Fremont Cottonwood (P. fremontii) replaces it over much of southern California at lower elevation and/or warmer sites. Associated species above the floodplain of this alliance include Coast Live Oak (Quercus agrifolia), California Sagebrush (Artemisia californica), and lower elevation chaparral shrubs.

## **QZ**

### **EUCALYPTUS ALLIANCE**

Species of Eucalyptus: Blue Gum (Eucalyptus globulus), Red Gum (E. camaldulensis), Silver Gum (Eucalyptus polyanthemos), Forest Red Gum (Eucalyptus tereticornis) and others are now established in dense, pure stands at lower elevations, below about 3000 ft (915 m) in the Coast and Mountains Sections. These stands are widely scattered and are seldom extensive in nature, having been initially established through cultivation. Naturalization has occurred in disturbed areas, augmented by the ability of this genus to resprout after disturbance. Some of these Eucalyptus plantations are included within the Non-Native Ornamental Hardwood Alliance are typically adjacent to urban areas and annual, usually non-native grasses.

## **TX**

### **MONTANE MIXED HARDWOOD ALLIANCE**

This alliance of mixed hardwood species differs from the other upland types (Coastal Mixed Hardwood and Interior Mixed Hardwood Alliances) by having an abundance, but not dominance, of Black Oak (Quercus kelloggii) in the mixture. The elevation of these sites, where mapped, typically also differ with a higher general range from about 4000 – 6400 ft (1220 -1952 m), although the distribution is more limited in this zone. It has been identified only in scattered locations in the Northern Transverse Ranges, Upper San Gabriel Mountains and San Gabriel Mountains Subsections of the Mountains Sections. These sites occur in close proximity or within the Bigcone Douglas-fir (Pseudotsuga macrocarpa), Canyon Live Oak (Q. chrysolepis), Lower Montane Mixed Chaparral, and Scrub Oak (Quercus spp.) alliances.

## **UD**

### **DESERT WILLOW ALLIANCE**

The Desert Willow (Chilopsis linearis) Alliance is closely related to the Smoke Tree Alliance, sharing the same species with it such as Smoke Tree (Psoralea spinosa), Blue Palo Verde (Cercidium floridum), Desert Ironwood (Olneya tesota), and Honey Mesquite (Prosopis glandulosa). Although sparsely mapped, areas where Desert Willow is dominant in the washes extend into several subsections under Mojave and Colorado Desert environments. This alliance has been mapped up to an elevation of about 4800 ft (1462 m) in the Mountains Section.

## **UJ**

### **JOSHUA TREE ALLIANCE**

Joshua Tree (Yucca brevifolia) occurs as a dominant hardwood tree in this Alliance; the species is widespread and very characteristic of the Mojave Desert. This alliance has been mapped abundantly in the Little San Bernardino - Bighorn Mountains Subsection, and very sparsely in five other subsections of the Mountains Section. It generally occurs within the elevation range 3200 - 5800 ft (974 - 1768 m) on low-gradient and often north-facing slopes and alluvial fans in this region. Other species included as associates in this Alliance are Singleleaf Pinyon Pine (Pinus monophylla), California and Utah Junipers (Juniperus californica, Juniperus osteosperma), Teddybear Cholla (Opuntia bigelovii), Creosote Bush (Larrea tridentata), Muller Oak (Quercus cornelius-mulleri), Boxthorn (Lycium spp.), Cottonthorn (Tetradymia spp.), and Mormon Tea (Ephedra spp.).

## **UL**

### **CATCLAW ACACIA ALLIANCE**

Catclaw Acacia (Acacia greggii) is the dominant hardwood of this alliance, indicative of arid Mojave Desert sandy or gravelly washes and arroyos and other arid interior environments. It has been mapped in scattered stands of the Mountains Section at low to mid-elevations, mainly within 400 – 4400 ft (122 – 1342 m) on low-gradient slopes such as alluvial slopes and terraces. Species such as Smoketree (Psoralea spinosa), Sweetbush (Bebbia juncea), Burrobush (Hymenoclea salsola), Desert Lavender (Hyptis emoryi), and Mojave Rabbitbrush (Chrysothamnus paniculatus) may be associated with this Alliance.

## UM

### MESQUITE ALLIANCE

Either Honey (*Prosopis glandulosa* var. *torreyana*) or Screwbean Mesquite (*P. pubescens*) or their combination, dominates this alliance. These native Mesquites occupy a variety of sites close to ephemeral or more permanent water supplies such as washes, sandy alluvial or alkaline flats, playas, and arid grasslands. The alliance has been mapped in scattered areas of the Desert Slopes and very sparsely in the Little San Bernardino - Bighorn Mountains Subsections of the Mountains Section. Elevations are generally below 3800 ft (1158 m), slopes are often north-facing and of low gradient. The more salt-tolerant Honey Mesquite may be associated with other halophytes such as Fourwing Saltbush (*Atriplex canescens*) and Bush Seepweed (*Suaeda moquinii*). Screwbean Mesquite represents true desert riparian sites and may be associated with species such as Blue and Littleleaf Palo Verdes (*Cercidium floridum*, *C. microphyllum*), Smoke Tree (*Psorothamnus spinosus*), Desert Willow (*Chilopsis linearis*), and Boxthorn (*Lycium* spp.). Competition for water with Tamarisk (*Tamarix* spp.) may occur on some sites.

## UP

### PALO VERDE ALLIANCE

Blue (*Cercidium floridum*) forms the dominant hardwood of this alliance found in desert washes. Sparsely mapped in patches in the Little San Bernardino – Bighorn Mountains and Desert Slopes Subsections of the Mountains Section, it principally occurs within an elevation range of near or below sea level up to about 3200 ft (976 m) on low gradient slopes. It is associated with trees such as Desert Willow (*Chilopsis linearis*) and Desert Ironwood (*Olneya tesota*) and shrubs such as Burrobush (*Hymenoclea salsola*) and Desert Lavender (*Hyptis emoryi*).

## UT

### TAMARISK ALLIANCE

Any of various species of the introduced and invasive hardwood or tall shrubby Tamarisk (*Tamarix* spp.) are dominant in this semi-arid riparian alliance. It has been sparsely mapped in one subsection of the Coast and six in the Mountains Sections at elevations that are usually below 3000 ft (914 m). Active Tamarisk eradication programs cite the loss of desert or xeric riparian habitat due to the invasion of streams and washes and depletion of water sources by these aggressive plants. Associated species include those limited to sites of perennial water channels including desert phreatophytes such as Mulefat (*Baccharis salicifolia*), Desert Willow (*Chilopsis linearis*), Willow (*Salix* spp.) and Mesquite (*Prosopis* spp.).

## UW

### FAN PALM ALLIANCE

Fan Palm (*Washingtonia filifera*) occurs naturally in the eastern areas of San Diego and Riverside Counties within oases maintained by seeps, springs, or watercourses in the Colorado Desert. It has also been widely planted and some limited degree of naturalization has reportedly occurred. Active faulting processes induced some or all of these sites. As a dominant hardwood of this alliance, Fan Palm has been mapped in scattered patches in the Desert Slopes Subsection of the Mountains Section at elevations below about 2600 ft (792 m). Other species associated with the Fan Palm Alliance include Willows (*Salix* spp.) and Fremont Cottonwood (*Populus fremontii*).

## UX

### SMOKE TREE ALLIANCE

Smoke Tree (*Psorothamnus spinosus*) may occur infrequently in nearly pure stands in sandy washes of the Colorado Desert. It dominates this hardwood alliance and has been mapped sparsely at low elevations in the Desert Slopes Subsection of the Mountains Section. Other hardwoods in this Alliance include Blue Palo Verde (*Cercidium floridum*), Desert Ironwood (*Olneya tesota*), Desert Willow (*Chilopsis linearis*), and Honey Mesquite (*Prosopis glandulosa* var. *torreyana*).

## SHRUBS AND SUBSHRUBS

## AD

### WHITE BURSAGE ALLIANCE

White Bursage (*Ambrosia dumosa*), one of the more common desert shrubs, is dominant in this abundant alliance. It occurs, often in sandy areas, in close association with Creosote Bush (*Larrea tridentata*) very prominently in the Little San Bernardino – Bighorn Mountains and Desert Slopes Subsections of the Mountains Section. Brittlebush (*Encelia farinosa*) and less

frequently, California Juniper (*Juniperus californica*) are also likely to be found on these sites. The majority of mapped areas occur below 5000 ft (1524 m) on most slope gradients and aspects.

## **AX**

### **ALPINE MIXED SCRUB ALLIANCE**

Alpine flora in southern California is relatively poor in extent, but does occur on a few higher peaks. It has been mapped very sparsely on the higher ridges and slopes of San Gorgonio Mountain (San Bernardino County) above about 7600 ft (2318 m). A mixture of grasses, herbaceous plants, and often prostrate subshrubs occur on these short-season, exposed sites. Rounded, low-profile xerophytic plant forms ("cushion plants") such as Southern Alpine Buckwheat (*Eriogonum kennedyi* var. *alpigenum*) occur with other subshrubs and taller shrubs such as Sulfur Flower Buckwheat (*Eriogonum umbellatum*), Rock Spiraea (*Holodiscus microphyllus*), Wax currant (*Ribes cereum*), Mountain Gooseberry (*Ribes montigenum*), Purple Mountainheath (*Phyllodoce breweri*), Red Elderberry (*Sambucus racemosa*), and shrub Willows such as Geyer's (*Salix geyeriana*) and Lemmon's (*Salix lemmonii*). Perennials such as *Draba corrugata*, Silky Raillardella (*Raillardella argentea*), Campion (*Silene parishii*), Pussypaws (*Calyptidium monospermum*), Alpine Shooting Star (*Dodecatheon alpinum*), Buttercup (*Ranunculus eschscholtzii* var. *oxynotus*), Pumice Alpinegold (*Hulsea vestita*) as well as grasses and graminoid species such as Needlegrass (*Achnatherum occidentale*), Squirreltail (*Elymus elymoides*), Rushes (*Juncus* spp.), and Sedges (*Carex* spp.) may also be prominent in this Alliance.

## **BC**

### **SALTBUSH ALLIANCE**

Fourwing Saltbush (*Atriplex canescens*) is considered to be the most widely distributed native woody species in North America, naturally occurring from southern Alberta south to central Mexico and from the Pacific coast east to the Missouri River. It exhibits extreme genetic diversity and adaptability across its natural range. As it is salt, cold and drought resistant, Fourwing Saltbush has been widely planted as an ornamental, spreading as naturalized populations to areas east of the Great Plains grasslands. In this zone of southern California, it has been mapped as the typical Saltbush species in this native Saltbush Alliance. These sites have been identified widely but sparsely in five subsections of the Mountains Section at elevations below about 6800 ft (2074 m). Creosote Bush (*Larrea tridentata*), Brittlebush (*Encelia farinosa*) and Mesquite (*Prosopis* spp.) are commonly associated shrubs.

## **BM**

### **CURLLEAF MOUNTAIN MAHOGANY ALLIANCE**

Curlleaf Mountain Mahogany (*Cercocarpus ledifolius*), a large shrub or small tree, has a wide distribution pattern from the Cascade Range in Washington east to Montana, Wyoming and Colorado and south through semiarid areas of California and Arizona to Baja California. As the variety *intermontanus* in this zone, it is the dominant shrub of this alliance on harsh, transmontane upper montane slopes. This alliance has been mapped in scattered locations in the Upper San Gorgonio Mountains Subsection and four others in the Mountains Section within the elevations of about 4600 – 9400 ft (1402 – 2867 m). Conifers such as Singleleaf Pinyon Pine (*Pinus monophylla*) and Jeffrey Pine (*Pinus jeffreyi*) and shrubs of semiarid environments such as Big Sagebrush (*Artemisia tridentata*), Rubber Rabbitbrush (*Chrysothamnus nauseosus*) and Mojave Ceanothus (*C. greggii* var. *vestitus*) are typically found within or adjacent to these sites.

## **BQ**

### **GREAT BASIN MIXED SCRUB ALLIANCE**

This type is defined by at least three common shrubs more characteristic of the Great Basin and Mojave Desert xeric environments to the northeast of this area. The mixture includes any combination of Big Basin Sagebrush (*Artemisia tridentata* var. *tridentata*), Bitterbrush (*Purshia tridentata*), Tucker's and/or Muller's Scrub Oaks (*Quercus john-tuckeri*, *Q. cornelius-mulleri*), Curlleaf Mountain Mahogany (*Cercocarpus ledifolius*), Rabbitbrush (*Chrysothamnus* spp.) and others such as interior Buckwheats (*Eriogonum* spp.) where none achieve dominance. The Great Basin Mixed Scrub type has been mapped abundantly in northerly sections of the Northern Transverse Ranges, Little San Bernardino – Bighorn Mountains and occasionally in four other subsections of the Mountains Section at elevations between about 2800 – 7800 ft (854 – 2379 m) in this zone.

## **BR**

### **RABBITBRUSH ALLIANCE**

Rubber Rabbitbrush and Stickyleaf Rabbitbrush (*Chrysothamnus nauseosus*, *C. viscidiflorus*) occur in California south to Riverside County. The Rabbitbrush Alliance is dominated by either, both or other species in this genus. It has been mapped abundantly in the Northern Transverse Ranges and occasionally in ten other subsections of the Mountains Section on dry slopes and flats within a wide elevation range of about 2600 – 8800 ft (792 – 2684 m). These sites often have been recently

burned or have undergone other disturbances such as livestock overgrazing on rangelands, road construction, landslides and the like. Stickyleaf Rabbitbrush has a more restricted range in this area and has not been found on alkaline soils. The more commonly occurring Rubber Rabbitbrush may grow on strongly alkaline as well as more neutral soils. In semiarid areas, associated species of this alliance include Singleleaf Pinyon Pine (*Pinus monophylla*), California Juniper (*Juniperus californica*), Bitterbrush (*Purshia tridentata* var. *glandulosa*), Big Sagebrush (*Artemisia tridentata*), Flannel Bush (*Fremontodendron californicum* ssp. *californicum*), Desert Almond (*Prunus fasciculata*), and many other shrubs.

## **BS**

### **BIG SAGEBRUSH ALLIANCE**

Big Sagebrush (*Artemisia tridentata*) dominates semiarid sites in much of the western United States. In southern California, the Big Sagebrush Alliance, identified mainly by the dominance of *Artemisia tridentata* ssp. *tridentata* and/or *A. t.* ssp. *vaseyana*, is found in dry interior and transmontane locations. These sites occur within a range of elevations and habitats where slopes are of low gradient and soils are coarse, often deep, and well drained. Typical sites are dry alluvial fans or washes. The alliance has been identified in the Mountains Section from southwestern Kern to southern San Diego Counties and mapped abundantly in the Little San-Bernardino – Bighorn Mountains and San Jacinto Foothills – Cahuilla Mountains Subsections and occasionally in twelve others. Elevations of these sites are in the range of about 1800 – 9200 ft (548 – 2806 m). Species associated with the Big Sagebrush Alliance include conifers such as Jeffrey Pine (*Pinus jeffreyi*), Singleleaf Pinyon Pine (*Pinus monophylla*), and dryland and low-elevation chaparral shrubs such as California Juniper (*Juniperus californica*), Rabbitbrush (*Chrysothamnus* spp.), Tucker's or Muller's Oaks (*Quercus john-tuckeri*, *Q. cornelius-mulleri*), California Buckwheat (*Eriogonum fasciculatum*), Red Shank (*Adenostoma sparsifolium*), Chamise (*A. fasciculatum*), and Manzanitas (*Arctostaphylos* spp.), and grasses such as *Bromus* spp.

## **BX**

### **GREAT BASIN - MIXED CHAPARRAL TRANSITION ALLIANCE**

This mixed chaparral to semiarid transitional type is indicated by combinations of dryland shrubs such as Big Sagebrush (*Artemisia tridentata*), Tucker's or Muller's Oaks (*Quercus john-tuckeri*, *Q. cornelius-mulleri*), Rabbitbrush (*Chrysothamnus* spp.), coupled with more mesic chaparral species such as Mountain Whitethorn (*Ceanothus cordulatus*), and Manzanitas (*Arctostaphylos* spp.). Minor amounts of Jeffrey Pine and Singleleaf Pinyon Pine may also be found in this alliance. It occurs principally in the transmontane areas of the San Gabriel Mountains and Northern Transverse Ranges Subsections of the Mountain Section, as well as occasionally in ten other subsections. Slopes are generally desert or south facing, with moderately steep to steep gradients. Most sites fall within elevations from about 1800 – 8800 ft (548 – 2684 m).

## **BZ**

### **GREAT BASIN – DESERT MIXED SCRUB ALLIANCE**

Great Basin species such as Big Sagebrush (*Artemisia tridentata*), Bitterbrush (*Purshia tridentata*) and Curlleaf Mountain Mahogany (*Cercocarpus ledifolius*) and more southerly Mojave desert species such as Saltbush (*Atriplex* spp.), Mormon Tea (*Ephedra nevadensis*, *E. viridis*), Creosote Bush (*Larrea tridentata*) and Horsebrush (*Tetradymia glabrata*, *T. stenolepis*) occur together in this type. This transitional alliance consists of representatives of these two groups occurring with equivalent abundance (cover) values. Such sites have been mapped within the elevation range of about 2400 – 6200 ft (732 – 1890 m) on desert-facing slopes of interior subsections of the Mountains Section. Associated by proximity to or within this alliance are Singleleaf Pinyon Pine (*Pinus monophylla*), Tucker's or Miller's Oaks (*Quercus john-tuckeri*, *Q. cornelius-mulleri*), California Juniper (*Juniperus californica*) and shrubs in the Desert Mixed Scrub Alliance.

## **CA**

### **CHAMISE ALLIANCE**

Chamise (*Adenostoma fasciculatum*), a shade-intolerant, relatively long-lived but fire-sensitive evergreen shrub, is considered to be the most characteristic and widely distributed chaparral species in California's foothills and coastal mountains. As a dominant shrub identifying this alliance, it often develops on sites that are harsher in terms of having shallow soils, recent fire disturbance, or having more xeric or sunnier environments (e.g., south facing slopes) than the adjacent Lower Montane Mixed Chaparral Alliance. Chamise appears to be affected by extreme winter temperatures, which limits its distribution in colder climates to the north and east, its natural range being from Mendocino County to Baja California, east to the Sierra Nevada foothills and west to the Channel Islands. This type has been mapped extensively in the Coast and Mountains Sections within twenty-four subsections, occupying most aspects and slope gradients. The elevation of these sites are generally below about 4800 ft (1464 m) in the Coast Section, and somewhat higher in interior sites of the Mountains Section. It grades into the Redshank (*Adenostoma sparsifolium*) Alliance in the Palomar Mountains in San Diego County and areas near the San Jacinto Mountains of Riverside County and elsewhere with the California Buckwheat (*Eriogonum fasciculatum*) and Annual Grasses

and Forbs Alliances. Very little other vegetation is found on these sites but Chaparral Yucca (*Yucca whipplei*) often occurs on more open sites and Coast Live Oak (*Quercus agrifolia*) is sometimes present in the immediate vicinity.

## CC

### CEANOTHUS CHAPARRAL ALLIANCE

Southern California chaparral is occasionally dominated in small areas by species of *Ceanothus* in contrast to the more extensively occurring mixed genera chaparrals. The Ceanothus Chaparral Alliance has been mapped extensively at low to mid elevations. This Alliance is identified by any of the following dominant or combinations of species: Hoaryleaf Ceanothus (*Ceanothus crassifolius*) and Wedgeleaf Ceanothus (*Ceanothus cuneatus*) in the western portions of the Transverse Ranges (Ventura and Los Angeles Counties), northern Peninsular Ranges and Santa Ana Mountains of San Diego and Riverside Counties; Cupleaf or Mojave Ceanothus (*Ceanothus greggii* var. *perplexans*, *C. g.* var. *vestitus*) in the eastern Transverse Ranges (San Bernardino County) and Peninsular Ranges of San Diego and Riverside Counties; Chaparral Whitethorn (*Ceanothus leucodermis*) forming dense post-fire stands in many areas, and Greenbark Ceanothus (*Ceanothus spinosus*). Other species in this Alliance include Hairy Ceanothus (*Ceanothus oliganthus*) in the western Transverse Ranges and Santa Ana Mountains, Woolyleaf Ceanothus (*Ceanothus tomentosus*) in the Santa Ana Mountains and Peninsular Ranges, and Bigpod Ceanothus (*Ceanothus megacarpus*) nearer the coast in the western Transverse Ranges. Sites range from mesic and coastal (Bigpod Ceanothus) to xeric (Cupleaf Ceanothus) with elevations ranging from near sea level in the Coast Section to about 6000 ft (1828 m) in the Mountains Section. Chamise (*Adenostoma fasciculatum*) occurs throughout this area and is commonly associated with these species.

## CD

### SOUTHERN MIXED CHAPARRAL ALLIANCE

The Southern Mixed Chaparral Alliance was named and cited by Robert F. Holland in 1986 and subsequently became a “Holland type” used by state agencies. It was considered to be a type transitional from southern California chaparral to the “coastal semi-desert of Baja California Norte”. In the present Calveg definition, it contains mixtures of fully woody and sometimes semi-woody, low-elevation chaparral and coastal sage scrub species in areas having somewhat lower precipitation and more moderate temperatures than in the Lower Montane Mixed Chaparral Alliance, which is often contiguous to it in San Diego and Riverside Counties. It is found in coastal foothills and further inland in the Coast Section at elevations usually between sea level and about 2200 ft (671 m) and in the Mountains Section at elevations up to about 3200 ft (976 m) on most slopes and aspects. There is usually no single dominant species, the indicator chaparral shrubs being Woolyleaf Ceanothus (*Ceanothus tomentosus*) or Mission Manzanita (*Xylococcus bicolor*). Both of these evergreen shrubs are distributed from Baja California northward into this zone, the Ceanothus also occurring in the Sierra Nevada foothills, possibly as variety *C. t.* var. *tomentosus* and confined to this zone as Ramona Lilac, *C. t.* var. *olivaceus*. Minor amounts of Chamise (*Adenostoma fasciculatum*) and Scrub Oak (*Quercus berberidifolia*) are often present in this Alliance. California Sagebrush Alliance species such as Purple and Black Sages (*Salvia leucophylla*, *Salvia mellifera*), California Sagebrush (*Artemisia californica*), Laurel Sumac (*Malosma laurina*), and Lemonade Berry (*Rhus integrifolia*) may be prominent in this Alliance.

## CK

### COYOTE BRUSH ALLIANCE

Coyote Brush (*Baccharis pilularis*), a relatively short-lived, shade-intolerant and versatile shrub, occurs along the coast ranges from Tillamook County, Oregon, south to the Channel Islands, San Diego County and Baja California and east to the foothills of the Sierra Nevada and California Cascades Mountains. Coastal populations exposed to saltspray and wind tend to have prostrate forms while inland, higher elevation specimens are usually erect and could grow up to about 12 ft (3.7 m) in height. It dominates this alliance in mixture with other species such as California Sagebrush (*Artemisia californica*), Coast Live Oak (*Quercus agrifolia*), and annual species of grasses such as *Bromus* spp. This type has been mapped at elevations generally below about 2400 ft (732 m) in the San Rafael - Topatopa Mountains Subsection (Mountains Section), and the Santa Ynez - Sulphur Mountains, Oxnard Plain - Santa Paula Valley and Simi Valley-Santa Susana Mountains Subsections (Coast Section). Coyote Brush appears to develop as a dominant shrub in this area on well-drained soils deeper than those supporting California Sagebrush sites. Coffeeberry (*Rhamnus californica*), Poison Oak (*Toxicodendron diversilobum*) and Orange Bush Monkeyflower (*Mimulus aurantiacus*) are other shrub associates in this area.

## CL

### WEDGELEAF CEANOTHUS ALLIANCE

Wedgeleaf Ceanothus (*Ceanothus cuneatus*) is an evergreen shrub of diverse habitats expressed in three varieties distributed across California and Baja California. As a dominant shrub, it defines this alliance and may dominate low elevation sandy coastal habitats in the Coast Section such as in westernmost Santa Barbara County within 500 ft (153 m) of sea level. More commonly, this type is found in shrub and woodland areas, having been mapped sparsely in the Mountains Section at

elevations up to around 5400 ft (1646 m). In those sites, its associated trees and shrubs are often semiarid species such as Big Sagebrush (*Artemisia tridentata*), Jeffrey Pine (*Pinus jeffreyi*) and Singleleaf Pinyon Pine (*P. monophylla*).

## CQ

### LOWER MONTANE MIXED CHAPARRAL ALLIANCE

The Lower Montane Mixed Chaparral Alliance occurs extensively on cismontane low to moderately high elevation slopes in southern California. It has been mapped with greater acreage than other alliance in this zone. The species mixture is highly variable across this diverse area and includes any combination of non-dominant Wedgeleaf (*Ceanothus cuneatus*), Cupleaf (*Ceanothus greggii perplexans*), Hoaryleaf (*Ceanothus crassifolius*), or Hairy Ceanothus (*Ceanothus oliganthus*); non-dominant Scrub Oak (*Quercus berberidifolia*), Bigberry (*Arctostaphylos glauca*), Eastwood (*Arctostaphylos glandulosa*), or other species of Manzanita (*Arctostaphylos* spp.), Toyon (*Heteromeles arbutifolia*), Chaparral Yucca (*Yucca whipplei*), Silktassel (*Garrya* spp.), California Buckwheat (*Eriogonum fasciculatum*), Chaparral Whitethorn (*Ceanothus leucodermis*), Sugar Bush (*Rhus ovata*), shrub Interior and Canyon Live Oaks (*Quercus wislizenii*, *Quercus chrysolepis*), Hollyleaf Redberry (*Rhamnus ilicifolia*) and Hollyleaf Cherry (*Prunus ilicifolia*). Chamise (*Adenostoma fasciculatum*) is usually abundant but not dominant in this Alliance. In the Coast Section, it has been mapped at elevations from sea level to around 5400 ft (1646 m), and up to about 8000 ft (2440 m) in the Mountains Section. Higher elevation sites typically have more prominent shrubby live oaks, which often resprout quickly after fires. The transformation from erect hardwoods to shrubs tends to raise this alliance into upper montane environments. Slope aspects and gradients are variable in this type.

## CR

### REDSHANK ALLIANCE

Redshank (*Adenostoma sparsifolium*), an evergreen shrub of restricted range, forms open and often pure stands in several discrete populations in central and southern California. Locations are usually at least 50 miles (80 km) inland from the coast. Chamise (*Adenostoma fasciculatum*), a common associate, may be prominent but is not clearly dominant in this alliance and generally occurs on drier or less productive microsites than the adjoining Redshank areas. In the Mountains Section, these stands have been mapped in areas of the Peninsular Ranges adjacent to Colorado Desert climatic influences such as in the rainshadow of the Palomar Mountains of San Diego County and south of the San Jacinto Mountains of Riverside County at elevations below about 6500 ft (1983 m). Locations mapped in the Coast Section are below about 3400 ft (1036 m). Slope gradients and aspects are variable and soils may be shallow but usually well-drained. Birchleaf Mountain Mahogany (*Cercocarpus betuloides*) and other drought-adapted species such as Muller Oak (*Quercus cornelius-mulleri*), Chaparral Yucca (*Yucca whipplei*), and Cupleaf or Desert Ceanothus (*Ceanothus greggii*) may also be present at low densities.

## CS

### SCRUB OAK ALLIANCE

Scrub Oak (*Quercus berberidifolia*) or other species of shrubby oaks may become dominant on north facing and often steep, mesic slopes at low to moderately high elevations in southern California. The Scrub Oak Alliance has been mapped extensively in the Mountains Section within sixteen subsections, and less frequently in the Coast Section in six subsections. These elevations are as low as near sea level and as high as about 9000 ft (2745 m). Any combination of Scrub Oak, Alvord Oak (*Q. x alvordiana*), Tucker or Muller Shrub Oak (*Q. john-tuckeri*, *Q. cornelius-mulleri*), Shrub Interior Live Oak (*Q. wislizenii* var. *frutescens*), Brewer Oak (*Q. garryana* var. *breweri*), Leather Oak (*Q. durata*), various shrub oak hybrids, and shrub Canyon Live Oak (*Q. chrysolepis* var. *nana*) may be present in this Alliance. Common chaparral associates are the shrubs Chamise (*Adenostoma fasciculatum*), Birchleaf Mountain Mahogany (*Cercocarpus betuloides*), Toyon (*Heteromeles arbutifolia*), species of *Ceanothus*, Sumacs (*Rhus* spp.), and Manzanita (*Arctostaphylos* spp.). In drier areas closer to the distribution of Tucker and Muller Oak, Redshank (*Adenostoma sparsifolium*), California Juniper (*Juniperus californica*), Singleleaf Pinyon Pine (*Pinus monophylla*), and Big Sagebrush (*Artemisia tridentata*) may associate with species of this alliance. Vines such as Poison Oak (*Toxicodendron diversilobum*), Cucumber Vine (*Marah macrocarpus*), and Honeysuckle (*Lonicera* spp.) also are common in mesic sites.

## CT

### TUCKER / MULLER SCRUB OAK ALLIANCE

This alliance is identified by the occurrence of either Tucker or Muller Oaks (*Quercus john-tuckeri*, *Q. cornelius-mulleri*) singly or in combination to form the dominant taxa of this semiarid shrub type. As they both have restricted ranges and similar taxonomic affiliations, they are considered together. Muller Oak occurs further east, where it is found on dry washes and slopes along interior Mojave or Colorado Desert or Great Basin margins in San Bernardino, Riverside and San Diego Counties. Associated species include Big Basin Sagebrush (*Artemisia tridentata* var. *tridentata*), Singleleaf Pinyon Pine (*Pinus monophylla*) and Junipers (*Juniperus* spp.). Tucker Oak occupies similar xeric habitats further north and west, including occurrences along the edges of the Tehachapi Mountains, slopes of the San Gabriel Mountains, etc. Both species appear to be



derived from the *Q. berberidifolia* / *Q. dumosa* shrub oak complex. This type has been mapped with some frequency in the Northern Transverse Ranges, San Gorgonio Mountains and Little San Bernardino – Bighorn Mountains Subsections and occasionally in nine other subsections in the Mountains Section. Elevations are generally between about 3000 – 6600 ft (915 – 2013 m). As this alliance grades into the lower Scrub Oak type, oak identification in the field is sometimes difficult.

## **CX UPPER MONTANE MIXED CHAPARRAL ALLIANCE**

This Alliance contains a mixture of chaparral species existing at moderately high elevation levels, generally above about 4200 ft (1280 m) in the Mountains Section. The Upper Montane Mixed Chaparral Alliance has been mapped abundantly in the Upper San Gabriel Mountains and Upper San Gorgonio Mountains Subsections and occasionally in nine others, often occupying open areas within coniferous woodland or forest. No single species is clearly dominant. Chamise (*Adenostoma fasciculatum*) is generally absent at these elevations. These sites are often steep or have rocky, shallow soils that are unfavorable to good conifer growth in the adjacent Mixed Conifer-Fir or Jeffrey Pine Alliances. Shrubs such as Mountain Whitethorn or Deerbrush (*Ceanothus cordulatus*, *C. integerrimus*), Bush Chinquapin (*Chrysolepis sempervirens*), and Greenleaf, Parry, Mexican, or Pink-Bract Manzanita (*Arctostaphylos patula*, *A. parryana*, *A. pungens*, *A. pringlei*) may occur in the mixture. Palmer Ceanothus (*C. palmeri*) is an indicator species in the Peninsular Ranges of San Diego County.

## **CY MOUNTAIN WHITETHORN ALLIANCE**

Shrub stands that are dominated by Mountain Whitethorn (*Ceanothus cordulatus*), an important wildlife browse species, may form dense brush fields after disturbances in forested areas such as high-intensity fires and logging. They may persist for decades on partially shaded sites. However, this alliance has only been mapped sparsely in the Northern Transverse Ranges and San Rafael – Topatopa Mountains Subsections of the Mountains Section. Elevations range from about 4100 – 8600 ft (1251 – 2623 m) on these sites. Jeffrey Pine (*Pinus jeffreyi*) and Rabbitbrush (*Chrysothamnus* spp.) are commonly adjacent to or within these sites as well as mixed shrub alliances such as Upper and Lower Montane Mixed Chaparrals and Great Basin – Mixed Chaparral Transition types.

## **CZ SEMI-DESERT CHAPARRAL ALLIANCE**

This alliance develops on interior (transmontane) slopes at elevations between about 1400 – 7400 ft (427 – 2256 m) in the Mountains Section. Sites, often open and sparsely vegetated, have been abundantly mapped in the San Gabriel Mountains and Desert Slopes Subsections and occasionally in eleven other sections. It is a transitional type that includes a mixture of common chaparral shrubs such as Chamise (*Adenostoma fasciculatum*), Birchleaf Mountain Mahogany (*Cercocarpus betuloides*), Bigberry Manzanita (*Arctostaphylos glauca*), and California Buckwheat (*Eriogonum fasciculatum*) with other desert or semi-desert shrub or perennial species such as Flannel Bush (*Fremontodendron californicum* spp. *californicum*), Tucker or Miller Scrub Oak (*Quercus john-tuckeri*, *Q. cornelius-mulleri*), Mojave or Desert Ceanothus (*Ceanothus greggii* var. *vestitus*), Brittlebush (*Encelia farinosa*), White Bursage (*Ambrosia dumosa*), Catclaw Acacia (*A. greggii*), Rabbitbrush (*Chrysothamnus* spp.), Mojave Yucca (*Yucca schidigera*), Prickly Pear or Cholla (*Opuntia* spp.), Desert Almond or Desert Apricot (*Prunus fasciculata*, *P. fremontii*), Big Sagebrush (*Artemisia tridentata*), and more rarely Creosote Bush (*Larrea tridentata*). As the main environmental factors are macroclimatic, no prominent slope aspects or gradients are indicated for this Alliance.

## **DA BLACKBUSH ALLIANCE**

Blackbrush (*Coleogyne ramosissima*) is dominant in this Mojave Desert Alliance on non-alkaline soils, and is also occasionally found in the Colorado Desert. Blackbush is often an indicator of older, unburned sites, as even light fires will suppress its ability to recolonize an area. This alliance is well-represented in the Mountains Section within the elevation range of about 2200 - 6000 ft (671 - 1828 m) and is often found on low-gradient alluvial or rocky slopes having shallow soils. Associated species are Singleleaf Pinyon Pine (*Pinus monophylla*), California and Utah Junipers (*Juniperus californica*, *J. osteosperma*), Joshua Tree (*Yucca brevifolia*), Muller Oak (*Quercus cornelius-mulleri*), Big Sagebrush (*Artemisia tridentata*), and Brittlebush (*Encelia farinosa*).

## **DB DESERT BUCKWHEAT ALLIANCE**

This alliance identifies the occurrence of California Buckwheat (*Eriogonum fasciculatum*) and other Buckwheats (*Eriogonum* spp.) found in true desert or desert-fringe environments in contrast to those found in more coastal or dry chaparral areas (Buckwheat Alliance). Other species such as the shrubby Wright's Buckwheat (*Eriogonum wrightii*) and the perennial Desert

Trumpet (*Eriogonum inflatum*) may be included as well as other Buckwheats adapted to arid and desert environments. This type is often initiated through fire or brush clearing and has been mapped sparsely in six subsections of the Mountains Section at elevations from about 1800 – 6800 ft (549 – 2074 m) on most slopes and aspects. Associated species are White Bursage (*Ambrosia dumosa*), Big Sagebrush (*Artemisia tridentata*), California Juniper (*Juniperus californica*), and Chamise (*Adenostoma fasciculatum*).

## **DC**

### **CHOLLA ALLIANCE**

Any species of Cholla (*Opuntia* spp.) alone or in combination defines this Colorado Desert Alliance in the Mountains Section. For example, Teddy Bear or Jumping Cholla (*O. bigelovii*) grows on coarse-textured alluvium of upper fans and bajadas as well as less rocky hillslopes in the Colorado Desert. This alliance has been mapped in the Little San Bernardino – Bighorn Mountains and Desert Slopes of the Mountains Sections at elevations ranging from about 800 - 4000 ft (244 - 1220 m) on all slope aspects and gradients. Creosote Bush (*Larrea tridentata*), White Bursage (*Ambrosia dumosa*), California Juniper (*Juniperus californica*), Muller Oak (*Quercus cornelius-mulleri*), Brittlebush (*Encelia farinosa*), Ocotillo (*Fouquieria splendens*), Hedgehog Cactus (*Echinocereus engelmannii*), and Barrel Cactus (*Ferocactus* spp.) are some associated species.

## **DI**

### **INDIGO BUSH ALLIANCE**

Any species of Indigo Bush or Dalea (*Psoralea* spp.) alone or in combination defines this alliance, with the exception of Smoketree (*P. spinosus*), which is more tree-like than other species. The following shrubs may occur in this zone along Mojave or Sonoran Desert fringe areas: Mojave Indigo Bush (*P. arborescens*), Dyebrush (*P. emoryi*), Fremont's Dalea (*P. fremontii*), Nevada Dalea (*P. polydenius*) or Schott's Dalea (*P. schottii*). The Indigo Bush Alliance has been mapped occasionally in the northeastern area of the Desert Slopes Subsection (Mountains Section) within the Mount San Jacinto rainshadow region in elevation ranges of about 100 – 2400 ft (31- 732 m). Shrubs in the Desert Mixed Shrub Alliance such as Brittlebush (*Encelia farinosa*) and Salbush (*Atriplex* spp.) and trees such as Palo Verde (*Cercidium floridum*, *C. microphyllum*) and Smoketree (*P. spinosus*) are sometimes found in close proximity to this type.

## **DL**

### **CREOSOTE BUSH ALLIANCE**

Creosote Bush (*Larrea tridentata*) characterizes much of the desert landscapes in North America. As a dominant shrub, it has been mapped abundantly over a broad area of Colorado and Mojave Deserts fringe areas within the Little San Bernardino – Bighorn Mountains and Desert Slopes Subsections of the Mountains Section in its extreme eastern subsections. It also has been mapped sparsely in three other subsections. Elevations of these sites occur up to about 5200 ft (1584 m) and on most slope gradients and aspects, although its best growth is on well drained soils with low alkalinity. White Bursage (*Ambrosia dumosa*) is the most commonly associated species on these sites. Upland desert and semi desert shrubs such as California Juniper (*Juniperus californica*), Brittlebush (*Encelia farinosa*), species of Yucca, Cacti (*Opuntia* spp.) as well as desert wash shrub species such as Indigo Bush (*Psoralea schottii*), Desert Lavender (*Hyptis emoryi*), and Bush Seepweed (*Suaeda moquinii*) may also be found in minor amounts on these sites.

## **DO**

### **OCOTILLO ALLIANCE**

Ocotillo (*Fouquieria splendens*), a drought-deciduous desert shrub, occurs as a dominant or indicator in this alliance. It has been mapped sparsely in the Desert Slopes Subsection of the Mountains Section at elevations generally less than 3000 ft (915 m). Sites are often rocky or on alluvial fans. More conspicuous, especially when in flower, than other shrubs in the immediate vicinity, Ocotillo is emergent above Creosote Bush (*Larrea tridentata*), Brittlebush (*Encelia farinosa*) and White Bursage (*Ambrosia dumosa*). Desert Agave (*Agave deserti*) and Hedgehog Cactus (*Echinocereus* spp.) also may occur in this alliance.

## **DS**

### **SHADSCALE ALLIANCE**

The Shadscale Alliance, a subtype of the Saltbush Alliance, is usually dominated by Shadscale - or Spiny Saltbush – (*Atriplex confertifolia*) in pluvial or dry lake basins with salt or alkaline accumulations along desert fringe areas of the zone. The alliance has been identified in scattered patches along the southeastern boundary of the Desert Slopes Subsection of the Mountains Section at elevations below about 1600 ft (488 m). Shrubs such as Creosote Bush (*Larrea tridentata*), Cheesebush (*Hymenoclea salsola*), White Bursage (*Ambrosia dumosa*), Horsebrush (*Tetradymia* spp.), Iodine Bush (*Allenrolfea occidentalis*), other Saltbushes (*Atriplex* spp.) and hardwoods such as Palo Verde (*Cercidium* spp.) and Smoke Tree (*Psoralea spinosa*) occur in close proximity to Shadscale.

## DV

### DESERT MIXED SUCCULENT SCRUB ALLIANCE

This desert alliance is defined by various combinations of leaf- and stem-succulent plants, excluding coastal succulents such as Cane Cholla and Coastal Pricklypear (*Opuntia parryi*, *O. littoralis*). In this area, shrubs in the mixture may include non-dominant Teddybear Cholla (*O. bigelovii*), Buckhorn Cholla (*O. acanthocarpa*), Grizzlybear Pricklypear (*O. erinacea*), Beavertail Pricklypear (*O. basilaris*), Engelmann Pricklypear (*O. engelmannii*), Tulip Pricklypear (*O. phaeacantha*), Mojave and Chaparral Yucca (*Yucca schidigera*, *Y. whipplei*), Desert Agave (*Agave deserti*), Strawberry Cactus (*Mammillaria dioica*), and Parry's Beargrass (*Nolina parryi*). Species such as Joshua Tree (*Yucca brevifolia*), Creosote Bush (*Larrea tridentata*) and Brittlebush (*Encelia farinosa*) may also occur in this alliance in minor amounts. It has been mapped in scattered areas of the Desert Slopes Subsection of the Mountains Section at elevations up to about 4800 ft (1464 m) on low-gradient slopes.

## DX

### DESERT MIXED SHRUB ALLIANCE

This alliance consists of clearly desert subshrub and shrub species along the dry margins of the Colorado and Mojave Deserts in the Mountains Section. No single species is dominant in this mixture. It is widespread and especially abundant in the Little San Bernardino – Bighorn Mountains and Desert Slopes Subsections and is found in scattered sites within nine others, having been mapped at elevations up to about 6600 ft (2012 m). The Desert Mixed Shrub Alliance may include any combination of desert shrubs, such as Cholla or Prickly Pears (*Opuntia* spp.), Joshua Tree, Chaparral, or Mojave Yuccas (*Yucca brevifolia*, *Y. whipplei*, *Y. schidigera*), Creosote Bush (*Larrea tridentata*), White Bursage (*Ambrosia dumosa*), Catclaw Acacia (*Acacia greggii*), species of Saltbush (*Atriplex* spp.), Ocotillo (*Fouquieria splendens*), Brittlebush (*Encelia farinosa*), Hop-Sage (*Grayia spinosa*), Agave (*Agave* spp.), Mormon Tea (*Ephedra* spp.), Barrel (*Ferocactus* spp.) and other species of Cacti, Boxthorn (*Lycium* spp.), Saltbush (*Atriplex* spp.), Blackbush (*Coleogyne ramosissima*), and other non-dominant desert species in any combinations. Creosote Bush and shrubby California Juniper (*Juniperus californica*) tend to be prominent in this mixture.

## FD

### EPHEDRA ALLIANCE

Very dry sites in this zone may be occupied and dominated by one or more species of Mormon Tea (*Ephedra* spp.), which are more common in desert areas to the northeast of this zone. Ephedra occupies a unique evolutionary position between other gymnosperms such as conifers that bear seeds in open cones and angiosperms that produce seed or fruit in closed receptacles. This genus is distributed in arid and sometimes very high xeric mountain areas of the world, including Asia, Europe, northern Africa, South America, Mexico, southwestern U.S., California and Oregon. Mormon Tea plants in this zone are shrubby desert gymnosperms with woody, green stems that aid in photosynthesis. Their leaves are both drought-deciduous and persistent in different species. The Ephedra Alliance has been mapped very sparsely in the northernmost areas of the Northern Transverse Ranges Subsection of the Mountains Section at elevations between about 5600 – 7100 ft (1708 – 2166 m). Such sites are found adjacent to other semidesert shrub and conifer species such as Big Sagebrush (*Artemisia tridentata*) and Singleleaf Pinyon Pine (*Pinus monophylla*).

## HS

### CHEESEBUSH ALLIANCE

Cheesebush (*Hymenoclea salsola*) dominates the shrub canopy of this desert alliance in the Mountains Section. It has been mapped within the elevation range of about 400 - 5600 ft (122 - 1706 m) on low-gradient flats, washes, and alluvial fans with east and north-facing aspects. These occur widely scattered on desert-fringe areas facing both the Mojave and Colorado Deserts in the Little San Bernardino – Bighorn Mountains and Desert Slopes Subsections. Creosote Bush (*Larrea tridentata*) and Brittlebush (*Encelia farinosa*) are the most consistent shrub associates. California Buckwheat (*Eriogonum fasciculatum*), California Juniper (*Juniperus californica*), Deerweed (*Lotus scoparius*), Red Brome (*Bromus madritensis* ssp. *rubens*), Mesquite (*Prosopis* spp.), Palo Verde (*Cercidium* spp.), Catclaw Acacia (*Acacia greggii*), Desert Baccharis (*Baccharis sergiloides*), and Mule Fat (*Baccharis salicifolia*) may also occur as associated species in this alliance.

## JC

### CALIFORNIA JUNIPER ALLIANCE

California Juniper (*Juniperus californica*) is generally shrub-like in this zone of Southern California, and is dominant in this alliance. It has been mapped abundantly in the Little San Bernardino – Bighorn Mountains, Desert Slopes and Sierra Pelona – Mint Canyon Subsections and more sparsely in nine others in the Mountains Section. These sites are at low to low montane elevations. Singleleaf Pinyon Pine (*Pinus monophylla*), California Buckwheat (*Eriogonum fasciculatum*), Muller Oak (*Quercus cornelius-mulleri*), Creosote Bush (*Larrea tridentata*), Blackbush (*Coleogyne ramosissima*), and many others may be found as associates in this alliance.

## LS

### SCALEBROOM ALLIANCE

Drainages of intermittent streams and washes in interior locations of the Mountains and Coastal Sections may be dominated by Scalebroom (*Lepidospartum squamatum*) in the vicinity of sandy and coarse-textured alluvial fans in this alliance. Greenbroom (*L. latisquamum*) is also a component of this alliance, occurring more locally on limestone areas in the San Gabriel Mountains and other northern subsections. The alliance has been mapped sparsely on low-gradient slopes in four subsections of the Coast Section at elevations below about 1500 ft (458 m) but is more widespread in scattered areas of eleven subsections of the Mountains Section at elevations up to about 5400 ft (1646 m). Scalebroom-dominated washes in western Mojave fringe areas have considerable winter and spring hydric flows and are closely related in site preference to the more abundant Riversidean Alluvial Scrub Alliance in these areas. Scalebroom associates with shrubs and subshrubs of mesic environments such as California Sagebrush (*Artemisia californica*) as well as those of xeric habitats such as Brittlebush (*Encelia farinosa*), Creosote Bush (*Larrea tridentata*), Chaparral Yucca (*Y. whipplei*), Rabbitbrush (*Chrysothamnus nauseosus*) and Big Sagebrush (*Artemisia tridentata*). Riparian hardwoods such as Fremont Cottonwood (*Populus fremontii*) and Desert Willow (*Chilopsis linearis*) may occur on or adjacent to these sites.

## ML

### BACCHARIS (RIPARIAN) ALLIANCE

This riparian or dry wash alliance is dominated by any species of *Baccharis* occupying wet habitats, including the most common, Mule Fat (*B. salicifolia*), Desert Baccharis (*B. sergiloides*), Shortleaf Baccharis (*B. brachyphylla*), Marsh Baccharis (*B. douglasii*), Broom Baccharis (*B. sarothroides*), and Emory Baccharis (*B. emoryi*). Tree willows (*Salix* spp.), California Sycamore (*Platanus racemosa*), Fremont Cottonwood (*Populus fremontii*), and Coast Live Oak (*Quercus agrifolia*) are some associated hardwoods in this Alliance. It has been mapped within seventeen subsections in this zone. Elevations are below 2000 ft (610 m) or so in the Coast Section and within the elevation range 200 - 4400 ft (60 - 1340 m) in the Mountains Section on low gradient slopes.

## NA

### ALKALINE MIXED SCRUB ALLIANCE

More extensively mapped in the South Interior Calveg zone, this alliance has been identified here with some frequency along the northeastern border of the Desert Slopes Subsection west of the Salton Sea in the Mountains Section. These sites occur within the elevation range of about 100 – 2600 ft (31 – 793 m), mostly within alkaline or saline interior drainage basins. These xeric areas are associated with shrubs such as Creosote Bush (*Larrea tridentata*), Saltbush (*Atriplex* spp.), Bursage (*Ambrosia dumosa*), Brittlebush (*Encelia farinosa*) and Indigo Bush (*Psoralea* spp.). Trees such as Palo Verde (*Cercidium* spp.) and Smoke Tree (*Psoralea spinosa*) may also occur near or on these sites.

## NB

### DESERT MIXED WASH SCRUB ALLIANCE

This alliance occupies desert washes and intermittent drainages and is not dominated by a single species. These environments are physically and botanically diverse, depending on factors such as the episodic nature of local water flows, disturbances by scouring, elevation, fire history, proximity to seed sources and the like. It has been mapped sparsely to prominently in five subsections of the Mountains Section on low-gradient slopes below about 4600 ft (1402 m). The shrub mixture includes non-dominant Cheesebush (*Hymenoclea salsola*), Saltbush (*Atriplex* spp.), Indigo Bush (*Psoralea schottii*), Bush Seepweed (*Suaeda moquinii*), Desert Lavender (*Hyptis emoryi*), Desert Agave (*Agave deserti*), non-dominant Greasewood (*Sarcobatus vermiculatus*), and Alkali Heath (*Frankenia salina*). Herbaceous species such as Alkali Sacaton (*Sporobolus airoides*), Saltgrass (*Distichlis spicata*), and/or Pickleweed (*Salicornia* spp.) may also be found on these sites. Trees that may be adjacent to or included in minor amounts in this type include Mesquite (*Prosopis* spp.), Smoke Tree (*Psoralea spinosa*), Palo Verde (*Cercidium* spp.) and/or Desert Willow (*Chilopsis linearis*).

## NM

### RIPARIAN MIXED SHRUB ALLIANCE

A community of mixed shrubs has been mapped in low elevation riparian and moist meadow sites over widespread areas of this zone. This type is represented in six subsections of the Coast Section and seven in the Mountains Section at elevations below about 3600 ft (1098 m). Shrubs in this mixture include species of shrub Willow (*Salix* spp.), Elderberry (*Sambucus* spp.), and Wild Rose (*Rosa* spp.) and occasionally Mule Fat (*Baccharis* spp.). The Riparian Mixed Shrub Alliance is most often found adjacent to annual grasses and forbs, California Sagebrush (*Artemisia californica*), Coast Live Oak (*Quercus agrifolia*), hardwoods of the Riparian Mixed Hardwood Alliance, and urban landscapes.

## NQ

### HIGH DESERT MIXED SCRUB ALLIANCE

The “High Desert” in this region is defined loosely as mid-montane Mojave Desert elevations that are generally above those of the warmer and presumably more xeric Desert Mixed Shrub Alliance, which is often found in close proximity to this type. These sites are characterized by indicator species such as Blackbush (*Coleogyne ramosissima*), Mormon Tea (*Ephedra* spp.), Hopsage (*Grayia spinosa*), Anderson Boxthorn (*Lycium andersonii*), Spiny Menodora (*Menodora spinescens*), White Bursage (*Ambrosia dumosa*) and Cacti species (*Opuntia* spp.). Creosote Bush (*Larrea tridentata*) is generally absent. This type has been mapped in the Little San Bernardino – Bighorn Mountains and three other subsections of the Mountains Section. Elevations range from about 3100 – 6500 ft (946 – 1983 m). Other species found adjacent to these sites include California Juniper (*Juniperus californica*), Singleleaf Pinyon Pine (*Pinus monophylla*), Muller Scrub oak (*Quercus cornelius-mulleri*) and Brittlebush (*Encelia farinosa*).

## RS

### RIVERSIDEAN ALLUVIAL SCRUB ALLIANCE

Alluvial fans and dry washes in xeric, interior areas of the Montane Section close to developed areas may contain a mixture of species, of which Scalebroom (*Lepidospartum squamatum*), California Buckwheat (*Eriogonum fasciculatum*), California Sagebrush (*Artemisia californica*), White Sage (*Salvia apiana*), and *Encelia* spp., may be prominent. Since the history of ground disturbance is a factor in the species composition of the Riversidean Alluvial Scrub Alliance, other species may also occur, including *Opuntia* spp., Chaparral Yucca (*Yucca whipplei*), *Rhus* spp., and California Juniper (*Juniperus californica*). It has been mapped as patchy areas of San Bernardino and Riverside Counties at elevations up to about 5000 ft (1524 m) on low-gradient slopes. In the Coast Section, where the alliance has also been mapped, these sites are usually sandy washes with episodic flood patterns. In species composition and geographic proximity, the Riversidean Alluvial Scrub Alliance merges with the California Buckwheat and California Sagebrush Alliances and takes its name from a type named by Robert Holland (“Holland type”) in the mid-1980s.

## SB

### BUCKWHEAT ALLIANCE

The combination of California Buckwheat (*Eriogonum fasciculatum*) with or unaccompanied by White Sage (*Salvia apiana*), form the dominant components of this interior alliance. It has been mapped very frequently in scattered locations in fifteen subsections of the Mountains Section at elevations up to about 7000 ft (2135 m) and much less abundantly in five subsections of the Coast Section. Chaparral Yucca (*Yucca whipplei*), *Encelia* spp., Cholla and Prickly Pear (*Opuntia* spp.), Sumacs (*Rhus* and *Malosma* species), and Deerweed (*Lotus scoparius*) are often present but Chamise (*Adenostoma fasciculatum*) is not prominent in this xeric Alliance. The sites are often sparsely vegetated and with good drainage. The degradation of Chamise or mixed chaparral sites from past fires or other surface or subsurface disturbance patterns appear to initiate and perpetuate many of these Buckwheat communities.

## SD

### MANZANITA CHAPARRAL ALLIANCE

The dominance of the shrub layer by single or multiple species of Manzanita (*Arctostaphylos* spp.) define this alliance. It is prominent in two subsections, chiefly on military lands, of the Coast Section at elevations below about 3000 ft (915 m) in low-gradient areas. Species in this region include clusters of several coastal endemics or rare species in western and southern areas of Santa Barbara County such as La Purissima Manzanita (*Arctostaphylos purissima*), Sand Mesa Manzanita (*Arctostaphylos rudis*), Woolyleaf Manzanita (*Arctostaphylos tomentosa*), and Refugio Manzanita (*Arctostaphylos refugioensis*). Associated species include California Sagebrush (*Artemisia californica*), Coast Live Oak (*Quercus agrifolia*), annual grasses and forbs and an occasional Mule Fat (*Baccharis* spp.). The Manzanita Chaparral Alliance has also been mapped in scattered areas of ten subsections in the Mountains Section, where it occurs at elevations from about 2200 – 8000 ft (671 – 2440 m) and includes such species as Greenleaf (*Arctostaphylos patula*), Parry (*Arctostaphylos parryana*), Bigberry (*Arctostaphylos glauca*), Eastwood (*Arctostaphylos glandulosa*), Mexican (*Arctostaphylos pungens*), and Pink-Bract Manzanita (*Arctostaphylos pringlei* spp. *drupacea*).

## SE

### ENCELIA SCRUB ALLIANCE

This Alliance is dominated by either the shrubs Brittlebush (*Encelia farinosa*) and/or Acton’s Brittlebush (*E. actoni*), tolerant of arid environments in the coast or desert and/or the more coastal California Encelia (*Encelia californica*). The Encelia Scrub Alliance is uncommon in the Coast Section and has been mapped mainly on south-facing slopes and coastal bluffs of low to moderate gradients below about 600 ft (183 m) in the Los Angeles Plain Subsection. The associated species include California Sagebrush (*Artemisia californica*), California Buckwheat (*Eriogonum fasciculatum*), Coast Cactus (*Opuntia littoralis*), and

Lemonade berry (*Rhus integrifolia*). The more frequent occurrence of Brittlebush in arid environments of the Mountains Section tends to be on mid to high gradient slopes at elevations up to about 5000 ft (1524 m). Associated shrubs in this section include those of desert affinities such as Creosote Bush (*Larrea tridentata*), White Bursage (*Ambrosia dumosa*), and California Juniper (*Juniperus californica*).

## SH

### COASTAL BLUFF SCRUB ALLIANCE

Remnants of this formerly more widespread coastal Alliance are found in scattered and exposed preserves of San Diego County and elsewhere in the Coast Section. It has been mapped infrequently below 600 ft (182 m) on low-gradient slopes in this area. Indicator species include Saltbush (*Atriplex* spp.), Sea-Dahlia (*Coreopsis maritima*), California Encelia (*Encelia californica*), Heather Goldenbush (*Ericameria ericoides*), Cucumber Vine (*Marah macrocarpus*), Coast Prickly Pear (*Opuntia littoralis*), Shaw's Agave (*Agave shawii*), and Lemonade berry (*Rhus integrifolia*) and non-natives such as Fig Marigold (*Carpobrotus chilensis* and *Carpobrotus edulis*), and Iceplant (*Mesembryanthemum crystallinum*). Other species often found in this Alliance include Morning Glory (*Calystegia* spp.), Indian Paintbrush (*Castilleja* spp.), Fleabane Daisy (*Erigeron* spp.), Woolly Sunflower (*Eriophyllum* spp.), and Spineflower (*Chorizanthe* spp.).

## SL

### COASTAL LUPINE ALLIANCE

Dune Lupine (*Lupinus chamissonis*), a California native, is an indicator species in coastal dunes in extreme northwestern Santa Barbara County for this Alliance. It may or may not become the dominant shrub in these vegetated dunes, but is generally present in the general area. The stabilized coastal dune habitat supports other species there, including non-natives such as Fig Marigolds (*Carpobrotus chilensis* and *Carpobrotus edulis*), Iceplants (*Mesembryanthemum crystallinum* and *Mesembryanthemum nodiflorum*) and herbaceous annuals such as New Zealand Spinach (*Tetragonia tetragonioides*). Other associated perennials, shrubs and subshrubs include Heather Goldenbush (*Ericameria ericoides*), California Sagebrush (*Artemisia californica*), Giant Woollystar (*Eriastrum densifolium*), Dune Buckwheat (*Eriogonum parvifolium*), California Croton (*Croton californicus*), Common Deerweed (*Lotus scoparius*), Sand Verbena (*Abronia latifolia*), Dune Senecio (*Senecio blochmaniae*), California-Aster (*Lessingia filaginifolia*), and perennial graminoids such as *Carex* spp. and *Bromus* spp.

## SM

### SUMAC SHRUB ALLIANCE

This alliance is dominated by species of *Rhus* or *Malosma*. Associated hardwoods include Coast Live Oak (*Quercus agrifolia*) and California Walnut (*Juglans californica*). In the Coast Section, it occurs abundantly in the Santa Monica Mountains Subsection and occasionally in six others below about 4000 ft (1220 m) on moderate to steep slopes. Laurel Sumac (*Malosma laurina*) and Lemonade berry (*Rhus integrifolia*) are important components in this region. The occurrence of the Sumac Shrub Alliance in the Mountains Section is more often on steep slopes below about 4400 ft (1342m) in twelve subsections, where it has been mapped occasionally. Sugar bush (*Rhus ovata*) is characteristic of those sites. Skunkbush (*Rhus trilobata*) may be present, but rarely becomes an important component. Other species often found in this type are California Sagebrush (*Artemisia californica*), and annual grasses and forbs.

## SO

### COASTAL CACTUS ALLIANCE

Drier areas of the coastal plain may be dominated by any combination of species of *Opuntia*, including Coast or Tall Coast Prickly Pears (*Opuntia littoralis*, *Opuntia oricola*) and Bluff and Cane Cholla (*Opuntia proliferata*, *Opuntia parryi*). The Coastal Cactus Alliance has been mapped as far inland as the northeastern edge of the Los Angeles Plain Subsection (Coastal Section) and the northwestern edge of the Santa Ana Mountains Subsection (Mountains Section). It is associated with other shrubs such as California Sagebrush (*Artemisia californica*), California Buckwheat (*Eriogonum fasciculatum*), Sumacs (*Rhus* spp.), California Encelia (*Encelia californica*), Black Sage (*Salvia mellifera*), Bush Monkeyflower (*Mimulus aurantiacus*), and grasses in scattered locations of nine subsections at elevations up to about 1800 ft (548 m).

## SQ

### SOFT SCRUB - MIXED CHAPARRAL ALLIANCE

Ground disturbances such as fire and urban development often initiate the development of this relatively short-lived shrub alliance. It is a mixture of subshrubs, forbs, and woody shrubs, having a substantial woody shrub component. These areas have been mapped in transitional areas often found in proximity to the California Sagebrush and Lower Montane Mixed Chaparral Alliances in the Coast Section. These sites are typically at elevations below about 3400 ft (1036 m) on moderately steep slopes in the Coast Section and below about 5800 ft (1768 m) in the Mountains Section on steep slopes there. Indicator species include California Sagebrush (*Artemisia californica*), California Buckwheat (*Eriogonum fasciculatum*), White Sage

(*Salvia apiana*), Deerweed (*Lotus scoparius*), Coyote Brush (*Baccharis pilularis*), California Encelia (*Encelia californica*), Bush Monkeyflower (*Mimulus aurantiacus*), Bush Poppy (*Dendromecon rigida*), Straggly Keckiella (*Keckiella cordifolia*), Yerba Santa (*Eriodictyon* spp.), and Goldenbush (*Ericameria* spp.). In addition, Chamise (*Adenostoma fasciculatum*), species of *Ceanothus*, scrub Interior and Canyon Live Oaks (*Quercus wislizenii* var. *frutescens*, *Q. chrysolepis* var. *nana*) and Scrub Oak (*Q. berberidifolia*) may become minor components of this alliance.

## SS

### CALIFORNIA SAGEBRUSH ALLIANCE

This Alliance occurs in several habitats, including coastal environments such as the dunes south of Point Conception and coastal slopes of the Coastal Section. It also is found in more interior low-elevation locations below the Lower Montane Mixed Conifer Alliance and in local pockets of disturbed or dry sites, typically at elevations below about 3000 ft (915 m). The Alliance usually has a prominent California Sagebrush (*Artemisia californica*) component along with a varying mixture of other shrubs, subshrubs, and perennials. These associates include Black or Purple Sage (*Salvia mellifera*, *Salvia leucophylla*), Laurel Sumac (*Malosma laurina*), Lemonade Berry (*Rhus integrifolia*), California Buckwheat (*Eriogonum fasciculatum*), Coyote Brush (*Baccharis pilularis*), California Encelia (*Encelia californica*), minor amounts of Chamise (*Adenostoma fasciculatum*), Deerweed (*Lotus scoparius*), and grasses. These species produce a vegetative cover, which rapidly invades disturbed areas. This type intergrades with the Lower Montane Chaparral, California Buckwheat (*Eriogonum fasciculatum*), and Sumac (*Rhus* spp.) shrub alliances. Annual grasses and forbs and Coast Live Oak (*Quercus agrifolia*) are found in close proximity to this type in many areas.

## SY

### CHAPARRAL YUCCA ALLIANCE

Chaparral Yucca (*Yucca whipplei*), a nutritious and adaptable species used by wildlife and Native Americans, occasionally dominates a dry site in southern California. It has been mapped very sparsely on steep, relatively undisturbed slopes in the Northern Transverse Ranges Subsection of the Mountains Section at elevations between about 4000 – 6200 ft (1220 – 1891 m) in association with other xeric species such as California Buckwheat (*Eriogonum fasciculatum*) and Singleleaf Pinyon Pine (*Pinus monophylla*). Annual grasses and forbs are sometimes found spatially adjacent to or within this alliance.

## TB

### BITTERBRUSH – SAGEBRUSH ALLIANCE

Both Bitterbrush (*Purshia tridentata* var. *glandulosa* and *P. mexicana* var. *stansburyana*) and Big Sagebrush (*Artemisia tridentata*) occur together in this alliance on dry, inland sites. Although pure stands of Bitterbrush are rare in this zone, this alliance is desirable to map since it is an important browse species for desert wildlife and adds nitrogen to these typically nutrient-poor soils. However, the alliance has been mapped only very sparsely in the San Geronio Mountains Subsection of the Mountains Section at elevations approximating 7200 ft (2196 m). These areas would otherwise be dominated by Ponderosa or Jeffrey Pines (*Pinus ponderosa*, *P. jeffreyi*), Big Sagebrush and herbaceous dryland species.

## TM

### HORSEBRUSH ALLIANCE

Portions of the southwestern Mojave Desert are often dominated by Horsebrush (species of *Tetradymia*) at elevations between 3400 - 5400 ft (1036 - 1646 m). It has been mapped sparsely in the Little San Bernardino – Bighorn Mountains Subsection of the Mountain Section on distinctly north-facing slopes and on moderately steep slopes. Associated species include Blackbush (*Coleogyne ramosissima*), Singleleaf Pinyon Pine (*Pinus monophylla*), Muller Scrub Oak (*Quercus cornelius-mulleri*), Creosote Bush (*Larrea tridentata*), Cheesebush (*Hymenoclea salsola*), Boxthorn (*Lycium* spp.), Four-wing Saltbush (*Atriplex canescens*), and Bitterbrush (*Purshia tridentata* var. *glandulosa*) and, in Riverside County, Joshua Tree (*Yucca brevifolia*) and California Juniper (*Juniperus californica*) as well.

## TS

### SNOWBERRY ALLIANCE

Species of Snowberry (*Symphoricarpos* spp.) rarely dominate a site in this zone but this alliance has been mapped sparsely in the Northern Transverse Subsection of the Mountains Section at elevations between about 6000 – 8700 ft (1830 – 2654 m). Mountain Snowberry (*S. rotundifolius*), the most important species at these altitudes, occurs on rocky areas and in forest openings within the Jeffrey Pine (*Pinus jeffreyi*), Eastside Pine and Mixed Conifer – Fir Alliances. Great Basin influence is indicated by its association with Rabbitbrush species (*Chrysothamnus* spp.) and Big Sagebrush (*Artemisia tridentata*) and at the higher elevations, with Limber Pine (*P. flexilis*).

## WL

### WILLOW (SHRUB) ALLIANCE

Shrub forms of Willow (Salix spp.) have been mapped in most subsections of the Coast and Mountain Sections from western Santa Barbara to southern San Diego Counties at elevations generally below about 7000 ft (2135 m). Narrowleaf (S. exigua), Arroyo (S. lasiolepis), Shining (S. lucida), Scouler (S. scouleriana) and Sitka (S. sitchensis) Willows are likely to occur at these elevations in this alliance. Riparian associates of these sites include tree Willows, Cottonwoods (Populus spp.), White Alder (Alnus rhombifolia), Elderberry (Sambucus spp.), Baccharis species and too often herbaceous species like the invasive Giant Reed (Arundo donax).

## WM

### BIRCHLEAF MOUNTAIN MAHOGANY ALLIANCE

Birchleaf Mountain Mahogany (Cercocarpus betuloides) may occasionally occur in pure stands on xeric, semi-desert, cliff, or even moist sites to the exclusion of other species. The Birchleaf Mountain Mahogany Alliance, where it is the dominant shrub, is also associated with the conifers Bigcone Douglas-fir (Pseudotsuga macrocarpa) and Singleleaf Pinyon Pine (Pinus monophylla), the hardwoods Canyon Live Oak (Quercus chrysolepis), and shrubs such as Chamise (Adenostoma fasciculatum), species of Ceanothus and Manzanita (Arctostaphylos spp.), various Scrub or shrubby Oaks (Quercus spp.), and Flannelbush (Fremontodendron californicum ssp. californicum). These stands have been mapped mainly below about 8000 ft (2440 m) in the Mountains Section on steep and often south-facing slopes.

## HERBACEOUS

## HA

### ALKALINE MIXED GRASSES AND FORBS ALLIANCE

Alkaline and hyper-saline soils occur in xeric sectors of this zone in internal drainage basins that accumulate soluble salts and may have moist pockets. Areas occupied by herbaceous species and grasses adapted to these conditions have been mapped sparsely as the Alkaline Mixed Grasses and Forbs alliance in the Desert Slopes Subsection of the Mountain Section within an elevation range of about 100 – 3500 ft (31 – 1068 m). These sites are adjacent to other desert species such as Creosote Bush (Larrea tridentata) and Saltbush species (Atriplex spp.), alliances such as the Desert Mixed Scrub and Alkaline Mixed Scrub, as well as barren or alkaline flat areas. In addition, herbaceous and graminoid species such as Saltgrass (Distichlis spicata), Alkali Sacaton (Sporobolus airoides) and Bush Seepweed (Suaeda moquinii) may be included in this mixture.

## HC

### PICKLEWEED - CORDGRASS ALLIANCE

This coastal salt marsh alliance is has been mapped sparsely and widely in seven subsections of the Coastal Section close to sea level. Pickleweed (Salicornia spp.) and Cordgrass (Spartina spp.) generally are dominants in this Alliance, associated with other estuarine plants such as Saltgrass (Distichlis spicata) and freshwater wetlands species such as Bulrushes (Scirpus spp.).

## HG

### ANNUAL GRASSES AND FORBS ALLIANCE

Low to mid-montane areas of southern California may develop extensive or restricted areas of dry grasslands in otherwise well-vegetated shrub or woodland regions. Conditions that restrict the growth and maintenance of, and invasion by species of surrounding vegetation include the occurrence of pockets of fine-textured (clayey) soils, a frequent fire regime, and ground-disturbing activities such as grazing, crop agriculture, and mining. Many exotic grasses are characteristic of this type, including species of wild oats (Avena spp.), various Bromes (Bromus spp.), Foxtail Fescue (Vulpia myuros), and Kentucky Bluegrass (Poa pratensis). This alliance also includes some perennial grasses that develop on coarse, well-drained soils occurring within sunny openings of Jeffrey and Ponderosa Pine (Pinus jeffreyi, Pinus ponderosa) savannas. In addition to species mentioned above, the Alliance may also include more natives such as some Sedges (Carex spp.), Melic Grass (Melica spp.), and Checker Bloom (Sidalcea malviflora). This type has been mapped typically on sites up to 4600 ft (1402 m) in the Coast Section and up to about 7800 ft (2379 m) in the Mountains Section.

## HJ

### WET MEADOWS ALLIANCE

Mountain meadows develop in coniferous areas on fine-textured, more or less permanently moist, or wet soils. These conditions in southern California often develop from springs, seeps or faulted areas in which a high water table is maintained



throughout the year. The San Bernardino, San Jacinto, and Peninsular Ranges contain many scattered moist mountain meadow areas at elevations generally above 3000 ft (914 m) in the south and higher in the north. They often have a dense growth of Sedges (Carex spp.), Rushes (Juncus spp.), perennial grasses such as Mat Muhly (Muhlenbergia richardsonis) and San Bernardino Bluegrass (Poa atropurpurea) and annual and perennial herbaceous species such as False Hellebore (Veratrum californicum), Clovers (Trifolium variegatum, Trifolium wormskioldii), Monkey Flower (Mimulus guttatus), etc. Mountain meadow areas have been mapped in the San Gorgonio Mountain region (San Bernardino NF) and elsewhere. Willows (Salix spp.), Roses (Rosa spp.), and Blue Elderberry (Sambucus mexicana) may occur along streambanks associated with some of these meadows. Although a range of hydric conditions usually occur within the same meadow (dry to saturated), the permanency of the water source at their lowest topographic level characterizes mountain meadows.

## **HM**

### **PERENNIAL GRASSES AND FORBS ALLIANCE**

Pockets of perennial grasses, often native species, and herbaceous plants occur abundantly in the Coast Section and occasionally in the Mountains Section at elevations generally below 5200 ft (1586 m). This Alliance forms on seasonally moist, low-gradient slopes. It is a form of dry to moist grassland in which the species composition is a mix of perennial and some annual grasses and legumes that vary according to management practices. Native perennial grasses such as Needlegrass (Achnatherum spp.) may occur in addition to Dropseed (Sporobolus spp.), Squirreltail (Elymus elymoides), and Wildrye (Leymus spp.). Introduced perennials such as Foxtail (Alopecurus myosuroides) and Tall Fescue (Festuca arundinacea) may be present with non-native forbs such as Strawberry Clover (Trifolium fragiferum) and non-native annual grasses such as Foxtail Chess (Bromus madritensis) and Ripgut Grass (Bromus diandrus) in this type. Some native forbs such as Southern Mules Ears (Wyethia ovata) may be found in this type as well. Some of these areas are currently being used for livestock pasture where the type intergrades with the Annual Grasses and Forbs Alliance.

## **HT**

### **TULE - CATTAIL ALLIANCE**

Cattail or Tule marshes occur near lakes and springs in widespread locations in this general area of the state. They have been mapped as high as 4600 ft (1402 m) elevation in the Mountains Section and up to about 1800 ft (550 m) in the Coast Section. Dominant species include Sedges (Carex spp.), Tule (Scirpus spp.), Cattail (Typha spp.), and Spikerush (Eleocharis spp.). A number of other species associate with this Alliance depending on the geographic area, including the invasive forb Loosestrife (Lythrum spp.). Past drainage activities have significantly reduced the total area once covered by this wetlands Alliance.

## **NON-NATIVE VEGETATION**

## **IA**

### **GIANT REED/ PAMPAS GRASS ALLIANCE**

This non-native and herbaceous alliance is dominated by invasive graminoids such as Giant Reed (Arundo donax) in wetlands or Black and White Pampas Grasses (Cortaderia jubata, Cortaderia selloana) on moist, disturbed sites. It has been mapped in stringers within five subsections of the Mountains Section and four in the Coast Section, mainly at elevations below about 2200 ft (671 m). Associated species include tree and shrub Willows (Salix spp.), the shrub Mule Fat (Baccharis salicifolia) and other riparian hardwoods such as Fremont Cottonwood (Populus fremontii).

## **IC**

### **NON-NATIVE/ORNAMENTAL CONIFER ALLIANCE**

Planted conifers comprise this Alliance, including species such as Canary or Norfolk Island Pines (Araucaria spp.), Deodar and Atlas Cedars (Cedrus deodar, Cedrus atlantica), Redwood (Sequoia sempervirens), Scotch Pine (Pinus sylvestris), etc. Other non-native hardwoods, shrubs, and grasses may be associated in minor amounts. Mapped areas of this Alliance are usually in developed areas, including urban and residential landscapes, parks, recreational areas, highways, cemeteries, etc.

## **IF**

### **NON-NATIVE / INVASIVE FORB / GRASS ALLIANCE**

Riparian and upland areas in southern California are sometimes invaded by aggressive herbaceous species that are not native to this state or area, as well as graminoids discussed elsewhere. Without managed control, these areas are often difficult to use for agricultural or recreational land purposes. They often require multi-year restoration procedures, including weeding, burning and reseeding with desirable species. Some of the problem species include Perennial Peppergrass (Lepidium latifolium), which may cause illness in horses, Medusahead Grass (Taeniatherum – or Elymus – caput-medusae), which may physically injure

grazing livestock, Puncturevine (Tribulus terrestris), which is toxic to livestock, Russianthistle (Salsola tragus), which is an alternate host for an insect carrying a virus that infects certain crops, Yellow Starthistle (Centaurea solstitialis), which is also toxic to horses and poses a challenge to eradicate, and many other Knapweeds (Centaurea spp.).

## **IG**

### **NON-NATIVE/ORNAMENTAL GRASS ALLIANCE**

Ornamental or non-native planted grass species define this alliance, although other non-native conifers, hardwoods, and shrubs may be associated as minor elements. Mapped areas of this Alliance are usually in developed areas, including urban and residential landscapes, parks, recreational areas, highways, cemeteries, etc.

## **IH**

### **NON-NATIVE/ORNAMENTAL HARDWOOD ALLIANCE**

Ornamental or non-native hardwood species dominate this alliance, although other non-native conifers, shrubs, and grasses may be present. Mapped areas of this Alliance are usually in developed areas, including urban and residential landscapes, parks, recreational areas, highways, cemeteries, etc.

## **IM**

### **NON-NATIVE/ORNAMENTAL CONIFER/HARDWOOD ALLIANCE**

Mixtures of ornamental or non-native conifer and hardwood species comprise the dominant species of this Alliance. Small amounts of non-native pure stands of hardwood, conifer, shrubs, and grasses may be also associated with this Alliance. Mapped areas of this Alliance are usually in developed areas, including urban and residential landscapes, parks, recreational areas, highways, cemeteries, etc.

## **IS**

### **NON-NATIVE/ORNAMENTAL SHRUB ALLIANCE**

Ornamental or non-native shrub species dominate this alliance, although other non-native conifers, hardwoods, and grasses may be present in this Alliance. Mapped areas of this alliance are usually in developed areas, including urban and residential landscapes, parks, recreational areas, highways, cemeteries, etc. Invasive shrubs such as Scotch Broom (Cytisus scoparius) may be included in this mixture.

## **LAND USE AND NON-VEGETATED CLASSES**

### **A1**

#### **CONIFER AGRICULTURE**

Agricultural or horticultural land planted to and dominated by single or multiple species of conifers may have year-round or seasonal uses of these lands. Examples include tree nurseries that provide seedlings for forestry restoration, “Christmas tree” plantations for seasonal uses, and the like. Native or exotic conifers may also be planted in narrow rows as wind breaks or for ornamentation uses within agricultural cropland, such as occasional plantations of Pacific Redwoods (Sequoia sempervirens) or Cypressess and Cedars (Cupressus, Callitropsis, Cedrus).

### **A2**

#### **VINEYARD – SHRUB AGRICULTURE**

Vines or shrubs may dominate the woody component of plantations on agricultural or horticultural lands used in the production of food or fiber such as vines devoted to grapes and kiwi fruit and shrubby nut or fruit crops such as blueberries or raspberries.

### **A3**

#### **TILLED EARTH AGRICULTURE**

Agricultural lands may be mapped as barren and lacking vegetation on occasion, such as after harvesting and during seasons prior to crop growth. Some areas may be kept fallow during and after the growing season for various reasons such as conservation of moisture and nutrients in a crop rotation schedule.

## **A4**

### **ORCHARD AGRICULTURE**

Orchards are usually evergreen or deciduous small trees producing fruit or nut crops, usually planted in rows with or without irrigation channels. Apples, citrus fruits, avocados, almonds, walnuts, peaches, olives and other familiar crops cover many acres in California. Occasionally, shrub forms may become horticulturally trained to resemble small trees, such as filberts.

## **A5**

### **FLOODED ROW CROP AGRICULTURE**

Agricultural lands planted to row crops are periodically flooded using flow-through structures such as levees, ditches and irrigation boxes in certain seasons for the production of wild and other rices in California. These areas are often underlain by poorly drained clay soils of the Central Valley that are unsuitable for production of other crops and are drained at harvest time. Some rice lands are reflooded after harvest to provide habitat for waterfowl such as ducks and geese that traditionally used the Pacific flyway for migration from northern to southern locations. The crushing of post-harvest rice straw in these areas provides a habitat for invertebrates which serve as high protein food for these overwintering waterfowl.

## **A6**

### **GRAIN AND CROP AGRICULTURE**

Irrigated or dry crop agriculture is usually harvested in rows as edible herbaceous products such as cereals (wheat, sorghum, oats, millet, corn, rye, etc.) and “vegetables” (squash, celery, beans, peas, etc.) for livestock and human uses. Agricultural crop fields are also occasionally planted for both animal forage and to improve nitrogen levels, as with legumes such as alfalfa and sweet clovers. Certain crops are grown for other multiple uses, such as flax and cotton for their seed oils (that is, linseed and cottonseed oils), fibers and medicinal uses, etc.

## **A7**

### **AGRICULTURE PONDS / WATER FEATURES**

Some artificially constructed water features on otherwise agricultural sites on farms, ranches and the like, are large enough to map and document. These sites include stock ponds, small reservoirs, large ditches and other utilitarian or recreational water features.

## **A8**

### **AGRICULTURAL NURSERIES (GENERAL)**

Horticultural sites within or outside urban areas may be mappable features. Many of these include potted or sometimes rooted woody or herbaceous plants that are sold as retail or wholesale species in various combinations and growth stages. Nurseries that are planted only to conifers are included in the Conifer Agriculture category.

## **AG**

### **AGRICULTURE**

Agricultural land is used primarily for the production of food and fiber. High-altitude imagery indicates agricultural activity by distinctive geometric field and road patterns on the landscape and traces produced by mechanized equipment. Agricultural land uses include forest landscapes such as orchards as well as non-forested land uses such as vineyards and field crops. This type represents agricultural features in which a prevailing covertype has not been determined. Land used exclusively for livestock pasture may, however, be mapped as Annual Grassland in those cases in which land uses are not recognizable.

## **AK**

### **ALKALINE FLATS**

Small barren areas in close proximity to the coast in Ventura County have been mapped as Alkaline Flats. These sites tend to be flooded in winter but dry out completely by late summer, creating saline or alkaline conditions in which vegetation is absent. They have been mapped sparsely in this zone in the Oxnard Plain-Santa Paula Valley Subsection of the Coast Section and are found adjacent to dry or moist grasslands or coastal marshes. Sites have also been identified in the Desert Slopes Subsection of the Mountains Section at elevations from about 2200 – 2600 ft (671 – 792 m). Such areas are adjacent to xeric types such as the Alkaline Grasses and Forbs, Saltbush (*Atriplex* spp.) and Creosote Bush (*Larrea tridentata*) Alliances.

## **BA BARREN**

Landscapes generally devoid of vegetation as seen from a high-altitude image source such as aerial photography are labeled as Barren. This category includes mappable landscape units in which surface lithology is dominant, such as exposed bedrock, cliffs, interior sandy or gypsum areas, and the like. It does not include areas considered as modified or developed, as in urban areas, but may include quarries and mine sites.

## **DU DUNE**

The occurrence of coastal dunes in this zone is identified by those sandy accumulating areas in which coastal headlands are usually absent, such as at Vandenberg Air Force Base, where they are best preserved. Dunes have been mapped as a barren type of landscape, including sandy beach areas extending from San Diego to Santa Barbara Counties, although finer-scale mapping in these areas might identify considerable shrubs and perennials such as Heather Goldenbush (*Ericameria ericoides*), Dune Lupine (*Lupinus chamissonis*), California Sagebrush (*Artemisia californica*), Giant Woollystar (*Eriastrum densifolium*), Dune Buckwheat (*Eriogonum parvifolium*), California Croton (*Croton californicus*), Common Deerweed (*Lotus scoparius*), Sand Verbena (*Abronia latifolia*), Dune Senecio (*Senecio blochmaniae*), California-Aster (*Lessingia filaginifolia*), the exotic Sea-Fig (*Carpobrotus chilensis*), and perennial graminoids such as *Carex* spp. and *Bromus* spp. The only vegetated dunes mapped in this region occur in northwestern Santa Barbara County as the Coastal Lupine Alliance, which contains many of these species.

## **IB URBAN-RELATED BARE SOIL**

Urban development in southern California occurs in phases. When land is cleared prior to being paved, this category represents the occurrence of non-vegetated barren ground that is caused by urbanization. This land-use type also represents other mechanically-caused barren ground, such as open quarries or mined areas, barren ground along highways, and other areas cleared of vegetation prior to construction. This category has been mapped extensively throughout this region, usually adjacent to agricultural areas, already established urbanized centers or paved areas of the landscape.

## **IW DEVELOPED WATER FEATURES**

Facilities for the capture and storage of surface or ground waters are sometimes quite visible in developed landscapes and can be recognized easily on aerial photographs. In southern California, these areas have been mapped in seven subsections of the Coast and eight subsections of the Mountain Sections. Such features as golf course ponds, collecting basins for replenishment of aquifers at the southern edges of the San Gabriel Mountains, small lakes in public parks, water and sewage treatment facilities and the like are included. This category may also identify some water treatment facilities within agricultural and rural areas, where they are often located.

## **OS BEACH SAND**

Oceanside littoral areas in southern California are rarely maintained as dunes but rather as managed beaches for recreationists and residents. Such linear features are usually not vegetated. Some areas closer to land, however, are often planted and maintained with non-native shrub and herbaceous species that help to stabilize blowing sands and are aesthetically pleasing. Beach sand areas may fluctuate in width from year to year due to their erosion under storm conditions, lack of coarse sediment replenishment from other causes such as inappropriate placement of jetties as well as depositional events such as manual replacement of sand by beach managers. These areas have been mapped in Ventura, Los Angeles and Orange Counties but similar beaches in San Diego County have been identified in older maps as “Barren” strips.

## **UB URBAN OR DEVELOPED**

This category applies to landscapes that are dominated by urban structures, residential units, or other developed land use elements such as highways, city parks, cemeteries and the like. In those cases in which the managed landscapes may have a considerable vegetation component, other land use categories may be more appropriate, such as Ornamental Conifer and Hardwood mixtures within city parks. Much of the landscape in southern California has been mapped in this category.

## **WA WATER**

Water is labeled in Calveg mapping in those cases in which permanent sources of surface water are identified within a landscape unit of sufficient size to be mapped. The category includes lakes, streams, and canals of various size, bays and estuaries and similar water bodies. These areas are considered to have a minimum of vegetation components, except along the edges, which may be mapped as types such as Wet Meadows, Tule-Cattail freshwater marshes, or Pickleweed-Cordgrass saline or mixed marshes. Islands of sufficient size within water bodies are mapped according to their terrestrial dominant vegetation types.

## **SECONDARY MAPPING SOURCES IN ZONE 7**

Other data sources have been used in this zone to augment mapping originated by the Remote Sensing Lab or its contractors. These were used to fill in areas that had not been mapped by RSL, but no or very little structural information or accuracy assessments are available for these layers. The sources are indicated as attributes within the tiling geodatabase structure given as downloadable files on the RSL web page. Calveg types have been crosswalked from the files in the original sources and described above in other areas; these types are indicated as occurring in the Channel Islands, as follows:

### **Conifers**

- Bishop Pine - PM
- Torrey Pine - PT

### **Hardwoods**

- Coastal Mixed Hardwood - EX
- Riparian Mixed Hardwood - NR
- Coast Live Oak - QA
- Willow (tree) - QO
- Eucalyptus - QZ

### **Shrubs**

- Coyote Brush - CK
- Lower Montane Mixed Chaparral - CQ
- Scrub Oak - CS
- Coastal Bluff Scrub - SH
- Coastal Lupine - SL
- Soft Scrub - Mixed Chaparral - SQ
- California Sagebrush (Coastal Sage Scrub) - SS

### **Herbaceous**

- Annual Grasses and Forbs - HG
- Perennial Grasses and Forbs - HM
- Tule - Cattail - HT

### **Non-native Vegetation**

- Non-native / Invasive Forbs - IF

### **Land-Use and Non-Vegetated**

- Agriculture - AG
- Barren - BA
- Dunes - DU
- Urban - UB
- Water - WA