

Vegetation Descriptions

NORTH COAST AND MONTANE ECOLOGICAL PROVINCE

CALVEG ZONE 1

December 11, 2008

Note: There are three Sections in this zone: Northern California Coast (“Coast”), Northern California Coast Ranges (“Ranges”) and Klamath Mountains (“Mountains”), each with several to many subsections

CONIFER FOREST / WOODLAND

DF

PACIFIC DOUGLAS-FIR ALLIANCE

Douglas-fir (*Pseudotsuga menziesii*) is the dominant overstory conifer over a large area in the Mountains, Coast, and Ranges Sections. This alliance has been mapped at various densities in most subsections of this zone at elevations usually below 5600 feet (1708 m). Sugar Pine (*Pinus lambertiana*) is a common conifer associate in some areas. Tanoak (*Lithocarpus densiflorus* var. *densiflorus*) is the most common hardwood associate on mesic sites towards the west. Along western edges of the Mountains Section, a scattered overstory of Douglas-fir often exists over a continuous Tanoak understory with occasional Madrones (*Arbutus menziesii*). When Douglas-fir develops a closed-crown overstory, Tanoak may occur in its shrub form (*Lithocarpus densiflorus* var. *echinoides*). Canyon Live Oak (*Quercus chrysolepis*) becomes an important hardwood associate on steeper or drier slopes and those underlain by shallow soils. Black Oak (*Q. kelloggii*) may often associate with this conifer but usually is not abundant. In addition, any of the following tree species may be sparsely present in Douglas-fir stands: Redwood (*Sequoia sempervirens*), Ponderosa Pine (*Ps ponderosa*), Incense Cedar (*Calocedrus decurrens*), White Fir (*Abies concolor*), Oregon White Oak (*Q garryana*), Bigleaf Maple (*Acer macrophyllum*), California Bay (*Umbellifera californica*), and Tree Chinquapin (*Chrysolepis chrysophylla*). The shrub understory may also be quite diverse, including Huckleberry Oak (*Q. vaccinifolia*), Salal (*Gaultheria shallon*), California Huckleberry (*Vaccinium ovatum*), California Hazelnut (*Corylus cornuta* var. *californica*), Poison Oak (*Toxicodendron diversilobum*), Oceanspray (*Holodiscus discolor*), Hairy Honeysuckle (*Lonicera hispidula*) and a wide range of other shrubs and forbs.

DG

DOUGLAS-FIR - GRAND FIR ALLIANCE

Both Douglas-fir (*Pseudotsuga menziesii*) and Grand Fir (*Abies grandis*) are the dominant conifers in some near-coastal locations of several subsections of the Coast Section below an elevation of approximately 2000 feet (610 m). This type is generally found within or at the western edges of Douglas-fir forests but typically east or south of the Sitka Spruce (*Picea sitchensis*) and Sitka Spruce - Grand Fir types. Most of the sites are underlain by marine sedimentary rocks such as sandstones and shales. The alliance has also been mapped very sparsely in the Western Jurassic Subsection of the Mountains Section at similar elevations. Red Alder (*Alnus rubra*), Tanoak (*Lithocarpus densiflorus*), Sword Fern (*Polystichum munitum*) and Oceanspray (*Holodiscus discolor*) commonly occur in this type. Willows (*Salix* spp.) and Coyote Brush (*Baccharis pilularis*) also are occasionally found on wetter sites.

DP

DOUGLAS-FIR - PINE ALLIANCE

Douglas-fir (*Pseudotsuga menziesii*) shares canopy dominance with Ponderosa Pine (*Pinus ponderosa*) at elevations below about 6000 feet (1830 m) in drier sites of the Mountains and Ranges Sections, and more rarely in the eastern sectors of the Coast Section. The type has been mapped within twenty-nine subsections, having greater spatial frequency towards the east and south sections of the zone. Knobcone Pine (*P. attenuata*) may occasionally be present as a minor component of the conifer overstory. Pacific Madrone (*Arbutus menziesii*), California Black Oak (*Quercus kelloggii*), Canyon Live Oak (*Q. chrysolepis*) and Bigleaf Maple (*Acer macrophyllum*) are often present in the understory, while Tanoak (*Lithocarpus densiflorus* var. *densiflorus*) is usually absent. This type may grade into the Mixed Conifer - Pine type in the Coast Ranges as site conditions become more mesic or disturbance factors less significant in the landscape. It is less prominent in the moister, outermost Klamath Mountains area where it intermixes with Pacific Douglas-fir forests.

DW

DOUGLAS-FIR - WHITE FIR ALLIANCE

Upper elevations of the Douglas-fir (*Pseudotsuga menziesii*) distribution often contain abundant but not dominant White Fir (*Abies concolor*) in the upper canopy, but not enough species diversity to support a mixed conifer type. The type in which both conifers dominate the conifer overstory is generally found below about 6400 feet (1952 m) in all three sections. Conifers such as Ponderosa Pine (*Pinus ponderosa*), Port Orford Cedar (*Chamaecyparis lawsoniana*), and Sugar Pine (*P. lambertiana*) are often present in minor amounts and Tree Chinquapin (*Chrysolepis chrysophylla*) and Bigleaf Maple (*Acer macrophyllum*) are often understory hardwoods. Shrub or Tree Tanoak (*Lithocarpus densiflorus* var. *echinoides* or *Lithocarpus densiflorus* var. *densiflorus*) may be present in the western areas along with Sadler Oak (*Quercus sadleriana*), a shade-tolerant shrub. The shrubs California Hazelnut (*Corylus cornuta* var. *californica*) and Pacific Dogwood (*Cornus nuttallii*) are often present, as well as an occasional Black or Canyon Live Oak (*Q. kelloggii*, *Q. chrysolepis*) in these stands. The Douglas-fir - White Fir type grades into the Douglas-fir, Mixed Conifer - Pine and White Fir types.

EA

ENGELMANN SPRUCE - SUBALPINE FIR ALLIANCE

This type identifies one of the common Rocky Mountain conifers, Engelmann Spruce (*Picea engelmannii*). In this region, it occurs only in the Salmon, Scott and Pit River watersheds of the Klamath Mountains Section. Subalpine Fir (*Abies lasiocarpa*), its usual associate further east, accompanies it in streamside terraces and moist slopes in the vicinity of Russian Peak in the Marble Mountains. These species sometimes are adjacent to Red Fir (*A. magnifica*), Mountain Hemlock (*Tsuga mertensiana*), and Western White Pine (*Pinus monticola*) stands, but has not yet been mapped as an alliance in this zone.

EP

EASTSIDE PINE ALLIANCE

The Eastside Pine type is dominated by Ponderosa Pine (*Pinus ponderosa*) or occasionally by Jeffrey Pine (*P. jeffreyi*) in this region. It occurs in the eastern edges of the Mountains Section, especially in the Upper Scott Mountains Subsection as well as in three other subsections at elevations between about 3200 – 6800 feet (976 – 2074 m), having its main distribution in the Southern Cascades Section (North Interior Calveg zone). Precipitation is usually low and Great Basin species commonly occur, especially in the northern areas of volcanic extrusives. Undergrowth varies depending on site conditions, but typically may include one or more of the following shrubs: Big Sagebrush (*Artemisia tridentata*), Bitterbrush (*Purshia tridentata*), Manzanita (*Arctostaphylos* spp.), *Ceanothus* spp., Rabbitbrush (*Chrysothamnus* spp.), Curleaf Mountain Mahogany (*Cercocarpus ledifolius*) and Snowberry (*Symphoricarpos* spp.). Western Juniper (*Juniperus occidentalis* var. *occidentalis*) may form an understory.

FP

FOXTAIL PINE ALLIANCE

Foxtail Pine (*Pinus balfouriana*) is more commonly seen in the South Sierran Calveg zone. In this zone, however, it forms almost pure open stands on higher elevation serpentine soils in the Upper Scott and Upper Salmon Mountains Subsections of the Mountains Section, such as on the southwestern slopes of Mount Eddy. The mapped elevation range is about 6800 – 8000 feet (2074 – 2440 m). This type also has been identified in the Eastern Franciscan Subsection of the Coast Ranges Section on sandstone, metavolcanic and schist parent materials in similar elevation ranges. Hardwood and shrub understory species usually occur infrequently but may include Low Sagebrush (*Artemisia arbuscula*).

GF

GRAND FIR ALLIANCE

This is the southern counterpart of the Grand Fir - Sitka Spruce type. It has been mapped below about 1400 feet (427 m) adjacent to the coast on shallow soils in Sonoma and Mendocino Counties north of the Russian River in the Coast Section. Grand Fir (*Abies grandis*) is often geographically associated with Redwood (*Sequoia sempervirens*), Douglas-fir (*Pseudotsuga menziesii*), Sitka Spruce (*Picea sitchensis*) and Bishop Pine (*Pinus muricata*) conifers. Associated hardwoods and shrubs in this type include Red Alder (*Alnus rubra*), Tanoak (*Lithocarpus densiflorus*), and Coyote Bush (*Baccharis pilularis*).

JP

JEFFREY PINE ALLIANCE

Jeffrey Pine (*Pinus jeffreyi*) is adapted to a variety of dry, nutrient-poor habitats in this region. Stands dominated by this pine define the alliance, but a variety of other species will occur depending on substrate, elevation and climate. Stunted Jeffrey Pine stands are found at low to middle elevations, usually below 5000 feet (1525 m) on strongly serpentinized peridotite sites in the western Mountains and Coast Sections, such as in the Smith River area. This mixture often includes scattered Douglas-fir

(*Pseudotsuga menziesii*), Ponderosa Pine (*P. ponderosa*), Incense Cedar (*Calocedrus decurrens*), Port Orford Cedar (*Chamaecyparis lawsoniana*), Sugar Pine (*P. lambertiana*), Lodgepole Pine (*P. contorta* ssp. *murrayana*) or Western White Pine (*P. monticola*) with few if any hardwood species. Associated shrubs on serpentinized substrates include Shrub Canyon Live Oak (*Quercus chrysolepis* var. *nana*), Wedgeleaf Ceanothus (*Ceanothus cuneatus*), Serpentine Goldenbush (*Ericameria ophitidis*) and Huckleberry Oak (*Q. vaccinifolia*). Where the species become more mixed on ultrabasic substrates, this type grades into the Ultramafic Mixed Conifer type. Jeffrey Pine-dominated sites have also been identified further inland in ultramafic areas of other subsections of the Mountains Section at elevations up to about 7000 feet (2170 m). These open sites also have a variety of montane conifers, including White Fir (*Abies concolor*). Shrubs such as the above and Pinemat Manzanita (*Arctostaphylos nevadensis*) may occur. In addition, relatively high-elevation Jeffrey Pine areas occur in small open stands in non-serpentinized areas of the Ranges Section such as in the Yolla Bolly Mountains and in many other subsections. They are usually found above 5000 feet (1525 m) in these upper montane areas in association with trees such as Canyon Live Oak (*Q. chrysolepis*), Oregon White Oak (*Q. garryana*), Sugar Pine, White Fir and the shrubs Pinemat Manzanita and Huckleberry Oak.

KP

KNOB CONE PINE ALLIANCE

Knobcone Pine (*Pinus attenuata*) forms pure and often even-aged dense stands in burned or nutrient-poor areas of low to moderate elevations in this zone. The type is usually found below 4800 feet (1464 m) within chaparral or lower coniferous areas but may occur above 5000 feet (1525 m) in eastern areas of the Mountains Section. Knobcone Pine may also be found on ultramafic or other infertile or dry soils and has been mapped within twenty-eight subsections of the three sections at varying frequencies and stand densities. Hardwoods such as California Black and Oregon White Oaks (*Quercus kelloggii*, *Q. garryana*), Canyon Live Oak (*Q. chrysolepis*), and Tanoak (*Lithocarpus densiflorus*) occur in these stands as well as a variety of shrubs such as shrubby oaks (*Quercus* spp.), Chamise (*Adenostoma fasciculatum*), Whiteleaf Manzanita (*Arctostaphylos viscida*), and other species of Manzanita (*Arctostaphylos* spp.). Associates of Knobcone Pine stands in western edges of the Mountains Section include Tanoak as a tree (*L. d.* var. *densiflorus*) or shrub (*L. d.* var. *echinoides*), and Douglas-fir (*Pseudotsuga menziesii*).

LP

LODGEPOLE PINE ALLIANCE

Lodgepole Pine (*Pinus contorta* ssp. *murrayana*) occurs in isolated pure stands or as an occasional associate of other types in the Marble Mountains and the eastern Siskiyou and elsewhere in the Mountains and Ranges Sections. Most of these stands are of limited extent in this zone, occasionally occurring on lower elevation ultramafic soils in the vicinity of conifers such as Western White Pine (*P. monticola*) and Port Orford Cedar (*Chamaecyparis lawsoniana*). Lodgepole Pine also has been mapped in sparse stands up to about 7600 feet (2318 m) in association with conifers such as Red and White Firs (*Abies magnifica*, *A. concolor*) in these higher elevation stands. In contrast to the Rocky Mountain subspecies (*Pinus contorta* ssp. *latifolia*), this subspecies is not typically associated with cone serotiny.

MD

INCENSE CEDAR ALLIANCE

Stands in which Incense Cedar (*Calocedrus decurrens*) becomes dominant are sometimes on low elevation, ultramafic substrates in this zone such as in the Coastal Franciscan Subsection of the Coast Section. The Incense Cedar Alliance has been mapped very sparsely within eight other subsections of the Mountains and Ranges Sections at elevations between about 2200 – 5800 feet (671 – 1768 m) in these areas. The type is sometimes found adjacent to conifers such as Douglas-fir (*Pseudotsuga menziesii*) and White Fir (*Abies concolor*).

MF

MIXED CONIFER - FIR ALLIANCE

A mixture of conifers, notably including White Fir (*Abies concolor*), forms an important type in this zone at elevations between about 4000 - 7400 feet (1220 - 2256 m) in 23 subsections in the three sections. These Mixed Conifer - Fir stands grade imperceptibly into the Douglas-fir - White Fir, Mixed Conifer - Pine and Ultramafic Mixed Conifer types, the lower elevations generally having more conifers common to Mixed Conifer - Pine forests such as Douglas-fir (*Pseudotsuga menziesii*), Ponderosa Pine (*Pinus ponderosa*) and Sugar Pine (*P. lambertiana*). White Fir gradually replaces Ponderosa Pine in abundance in this mixture as elevation increases, but Douglas-fir may remain prominent. Upper elevation mixtures (eg., those greater than about 5500 feet or 1678 m) often have more abundant Jeffrey Pine (*P. jeffreyi*), Western White Pine (*P. monticola*), Lodgepole Pine (*P. contorta* ssp. *murrayana*) and Red Fir (*Abies magnifica*) components. Incense Cedar (*Calocedrus decurrens*) may be present, especially on sites of weathered ultramafic bedrock such as in the southern Trinity Mountains (Rattlesnake Creek Subsection). Few if any hardwoods occur, although Canyon Live Oak (*Quercus chrysolepis*)

and Black Oak (*Q. kelloggii*) may be present in lower elevations. Pinemat Manzanita (*Arctostaphylos nevadensis*), Mahala Mat (*Ceanothus prostratus*) and Huckleberry Oak (*Quercus vaccinifolia*) are typical shrubs in this type.

MH

MOUNTAIN HEMLOCK ALLIANCE

Mountain Hemlock (*Tsuga mertensiana*) becomes a dominant conifer of subalpine areas and those at or just below timberline in limited areas of the Scott, Upper Scott and Upper Salmon Mountains, and Red Butte and Trinity Alps Subsections of the Mountains Section. The type is often found on steep, north-facing, concave slopes that retain late-lasting snow. Its mapped elevation range is in the vicinity of 6000 – 8200 feet (1830 -2501 m). The most common associates are Huckleberry Oak (*Quercus vaccinifolia*), Mountain Heather (*Phyllodoce empetriformis*), and Bush Chinquapin (*Chrysolepis sempervirens*) with Thinleaf Huckleberry (*Vaccinium membranaceum*) at the lower sites. Mountain Hemlock mixes with Red Fir (*Abies magnifica*) on warmer sites and is often identified in the Subalpine Conifer mixed type.

MK

KLAMATH MIXED CONIFER ALLIANCE

Local stands with an especially diverse mixture of conifer species occur in the Siskiyou, Salmon, Marble, Trinity and Scott Mountains within ten subsections of the Mountains Section. Elevations of the Klamath Mixed Conifer type generally are below 7800 feet (2379 m). High moisture factors coupled with high topographic relief and a variety of rock and soil types provide conditions for the maintenance of disjunct species in one general area. These include conifers with their primary distribution along the coast or northward in the Cascades such as Alaska Yellow Cedar (*Callitropsis* or *Chamaecyparis nootkatensis*), Noble Fir (*Abies procera*), Pacific Silver Fir (*A. amabilis*), Engelmann Spruce (*Picea engelmannii*) and Subalpine Fir (*A. lasiocarpa*) in the northern and central Rocky Mountains and those in the Sierra Nevada region such as Mountain Hemlock (*Tsuga mertensiana*) and Foxtail Pine (*P. balfouriana*). Species endemic to this general area of California include Brewer Spruce (*Picea breweriana*) and Port Orford Cedar (*Chamaecyparis* or *Cupressus lawsoniana*). Douglas-fir (*Pseudotsuga menziesii*), White Fir (*A. concolor*), Jeffrey Pine (*P. jeffreyi*), Western White Pine (*P. monticola*), Incense Cedar (*Calocedrus decurrens*), Sugar Pine (*P. lambertiana*), Ponderosa Pine (*P. ponderosa*) and Red Fir (*A. magnifica*) also occur commonly in this mixture. Understory shrubs and herbs are usually well developed on moist sites, including Huckleberry Oak (*Quercus vaccinifolia*), Greenleaf Manzanita (*Arctostaphylos patula*), Mahala Mat (*Ceanothus prostratus*), Pinemat Manzanita (*A. nevadensis*), Currant (*Ribes* spp.) and Barberrry (*Berberis* spp.). Many grasses and forbs occur in the understory as well.

MM

MONTEREY CYPRESS ALLIANCE

Monterey Cypress (*Cupressus* or *Callitropsis macrocarpa*) naturally occurs in a restricted range in the headlands around Carmel Bay in Monterey County (Central Coast and Montane Calveg zone), but has been widely planted along the northern California coast and elsewhere in the state. Because of its decorative structure and form, having a broadly spreading crown, it is used for hedges, windbreaks and as a shade tree. Prominent in the Point Arena Subsection of the Coast Section in Mendocino County, other Monterey Cypress stands are becoming naturalized, such as those in Marin County. These stands have been mapped in six subsections of this section at elevations of about 200 feet (61 m) or lower.

MN

MCNAB CYPRESS ALLIANCE

McNab Cypress (*Cupressus* or *Callitropsis macnabiana*) occurs sparsely in the Southern Cascades Section (North Interior Calveg zone) and the foothills of the Northern Sierra Nevada (Central Valley Calveg zone) with a broader distribution in this zone (North Coast and Montane Calveg zone). Stands in which it forms the dominant conifer have been mapped within seven subsections in the Ranges Section at elevations below about 3400 feet (1036 m). Usually found growing in numerous scattered groves in upper slope positions, the McNab Cypress type is often underlain by non-granitic substrates such as shallow ultrabasics. On xeric or interior sites, McNab Cypress tends to associate in small groves with Gray Pine (*Pinus sabiniana*), Sargent Cypress (*C. sargentii*), and Knobcone Pine (*P. attenuata*). Douglas-fir (*Pseudotsuga menziesii*), Tanoak (*Lithocarpus densiflorus*) and California Bay (*Umbellifera californica*) are more common associates towards the west. This cypress also occurs in association with many chaparral species, including Whiteleaf Manzanita (*Arctostaphylos viscida*), Chamise (*Adenostoma fasciculatum*), Wedgeleaf Ceanothus (*Ceanothus cuneatus*), and other manzanitas (*Arctostaphylos* spp.).

MO

BAKER CYPRESS

Baker Cypress (*Cupressus* or *Callitropsis bakeri*) occasionally occurs in isolated groves on serpentine soils in the Siskiyou Mountains of the Mountains Section. It is also found, but rarely, in volcanic areas further to the east, occurring within the

range of about 2800 – 5600 feet (854 -1708 m) as sparsely mapped in the Scott Bar and Red Butte Subsections. Shrubs such as Huckleberry Oak (Quercus vaccinifolia) and Wedgeleaf Ceanothus (C. cuneatus) sometimes occur in these stands.

MP

MIXED CONIFER - PINE ALLIANCE

No single conifer dominates the overstory of this extensively occurring mixed conifer type. It occurs on non- serpentinized or slightly (weathered) serpentinized soils at elevations below about 7000 feet (2135 m) in this zone. These stands have been mapped very commonly in twenty subsections of the Mountains Section and less abundantly in four subsections of the Ranges and five in the Coast Sections. Ponderosa Pine (Pinus ponderosa), Douglas-fir (Pseudotsuga menziesii) and White Fir (Abies concolor) are prominent in this mixture. Incense Cedar (Calocedrus decurrens) and Sugar Pine (P. lambertiana) are also found in this type. California Black Oak (Quercus kelloggii) and the shrub Greenleaf Manzanita (Arctostaphylos patula) typically associate on better sites, while Oregon White Oak (Q. garryana), Canyon Live Oak (Q. chrysolepis) and the shrub Whiteleaf Manzanita (A. viscida) may occur on harsher sites. Other shrub associates include Poison Oak (Toxicodendron diversilobum), Western Redbud (Cercis occidentalis), Mountain Whitethorn (Ceanothus cordulatus) and California Honeysuckle (Lonicera hispidula).

MS

SARGENT CYPRESS ALLIANCE

Sargent Cypress (Cupressus or Callitropsis sargentii) is the most widespread cypress in California, historically occurring in numerous scattered groves along creeks and ravines, slopes and ridges from Mendocino to Santa Barbara Counties up to an elevation of about 3300 feet (1000 m). In the Coast and Ranges Sections (four subsections), it is often confined to stream locations and ultramafic sites. These stands typically include individuals of McNab Cypress (C. macnabiana), Gray Pine (Pinus sabiniana), Oregon White Oak (Quercus garryana), Douglas-fir (Pseudotsuga menziesii) and common chaparral shrubs such as Coffeeberry (Rhamnus californica), Chamise (Adenostoma fasciculatum), Manzanita (Arctostaphylos spp.) and numerous others. In burned areas, this cypress may form dense thickets.

MU

ULTRAMAFIC MIXED CONIFER ALLIANCE

Low to moderate elevations in ultramafic and serpentinized areas in the western Mountains, Coast and Ranges Sections often produce soils low in essential minerals such as calcium and magnesium or have excessive accumulations of heavy metals such as nickel and chromium. These sites vary widely in the degree of serpentinization and effects on their overlying plant communities. Small stunted Western White Pine (Pinus monticola), Lodgepole Pine (P. contorta ssp. murrayana) and Jeffrey Pine (P. jeffreyi) occur in combinations or in nearly pure open stands on Trinity ophiolite areas of the Upper and Lower Scott Mountains and Eastern Klamath Mountains Subsections, especially on the less-weathered Josephine ophiolite of the Gasquet Mountains. Other common tree associates on ultramafics include Douglas-fir (Pseudotsuga menziesii), Incense Cedar (Calocedrus decurrens) and Port Orford Cedar (Chamaecyparis or Cupressus lawsoniana). Hardwoods are often sparse, but shrubs such as Pinemat and Whiteleaf Manzanita (Arctostaphylos nevadensis, A. viscida), Huckleberry and Brewer Oaks (Quercus vaccinifolia, Q. garryana var. breweri), California Coffeeberry (Rhamnus californica), Shrub Tanoak (Lithocarpus densiflorus var. echinoides), Western Azalea (Rhododendron occidentale), Boxleaf Silktassel (Garrya buxifolia) and Siskiyou Mat (Ceanothus pumilus) may occur on these sites. This type has been mapped at various spatial densities within twenty-two subsections at elevations less than about 7000 feet (2135 m).

MY

PYGMY (GOWEN) CYPRESS ALLIANCE

Pygmy Cypress (Cupressus goveniana ssp. pygmaea or Callitropsis pygmaea) is mostly confined to a marine terrace between Albion and Fort Bragg in Mendocino County (Fort Bragg Terraces Subsection of the Coast Section). It also is found in scattered stands south to the central Sonoma County coast (Point Arena Subsection) and occurs up to an elevation of about 1650 feet (500 m). This dwarf cypress is confined to poorly-drained acid soils derived from sandstones, which are often underlain by an iron hardpan. Bolander Pine (Pinus contorta ssp. bolanderi), Bishop Pine (P. muricata), Redwood (Sequoia sempervirens) and ericaceous shrubs such as Salal (Gaultheria shallon), Western Labrador Tea (Ledum glandulosum), and Pygmy (Arctostaphylos mendocinoensis), Hairy (A. columbiana) and Glossyleaf (A. nummularia) Manzanitas are common associates of this type.

PB

BREWER SPRUCE ALLIANCE

Brewer Spruce (*Picea breweriana*) a conifer endemic to the Siskiyou Mountains of northern California and southern Oregon, often occurs in areas with low fire incidence, usually north facing slopes, cold air basins, or rocky ridges. It can occur in small, dense stands growing on a variety of substrates including ultrabasics. It has been mapped as a dominant conifer sparsely in the Upper and Lower Salmon Mountains and North Trinity Mountain Subsections of the Mountains Section at elevations below about 6200 feet (1890 m). Red Fir (*Abies magnifica*), Noble Fir (*A. procera*), and especially White Fir (*A. concolor*) may also be present. In the Russian Peak area, Brewer Spruce occurs in an extensive stand associated with Red Fir, Huckleberry Oak (*Quercus vaccinifolia*) and Twin Flower (*Linnaea borealis*).

PD

GRAY PINE ALLIANCE

Gray Pine (*Pinus sabiniana*) reaches its northernmost distribution in the Mountains (this zone) and Southern Cascades Sections (North Interior Calveg zone) of California. This type has been mapped sparsely in the Coast Section (two subsections) and more abundantly in the Mountains (nine subsections) and Ranges Sections (six subsections) on a variety of dry sites in this region of the state. Stands in which it is the dominant emergent conifer are typically diverse and very open, with a mixture of hardwoods such as Blue Oak (*Quercus douglasii*), Oregon White Oak (*Q. garryana*), Canyon Live Oak (*Q. chrysolepis*), Pacific Madrone (*Arbutus menziesii*) and low-elevation chaparral shrubs such as Chamise (*Adenostoma fasciculatum*), shrub oaks (*Quercus* spp.), Whiteleaf and Common Manzanita (*Arctostaphylos viscida*, *A. manzanita*) and Wedgeleaf Ceanothus (*Ceanothus cuneatus*). Annual grasslands are sometimes found adjacent to Gray Pine stands and may form the ground layer in very open stands. These areas are often associated with ultramafic soils such as in the South Fork of the Salmon River where Jeffrey Pine (*Pinus jeffreyi*) and Leather Oak (*Q. durata*) may be present.

PE

SUGAR PINE ALLIANCE

Sugar Pine (*Pinus lambertiana*) is rarely found in pure stands, being more characteristic of mixed conifer forests, but has been mapped in several areas in this zone. Typically found on cooler, north-facing slopes, this tall pine dominates a few sites in the Scott Bar Mountain and East Klamath Mountains Subsections (Mountains Section) and the Eastern Franciscan Subsection (Ranges Section) at elevations less than about 5600 feet (1708 m). The typical hardwood associate is Canyon Live Oak (*Quercus chrysolepis*).

PM

BISHOP PINE ALLIANCE

Bishop Pine (*Pinus muricata*) occurs discontinuously along the coast from Humboldt County south to San Francisco at elevations below about 980 feet (300 m) in this zone. It is abundant in Mendocino and Sonoma Counties. Stands also exist in San Luis Obispo and Santa Barbara Counties, the Channel Islands and Baja California. The Bishop Pine type identifies stands in which it is the dominant conifer, commonly occurring on shallow, acidic or often poorly drained soils. Very dense, even-aged stands may develop after intense fire occurrences after this closed-cone pine releases its seeds. This type has been mapped in eight subsections of the Coast Section and one inland, older naturalized stand in the Central Franciscan Subsection of the Ranges Section. Understory herbaceous species such as Brakenfern (*Pteridium aquilinum*) and Sword Fern (*Polystichum munitum*) and shrubs such as Coffeeberry (*Rhamnus californica*) and California Huckleberry (*Vaccinium ovatum*) are common understory plants. Other associated trees include Douglas-fir (*Pseudotsuga menziesii*), Bolander Pine (*P. contorta* ssp. *bolanderi*), Pygmy Cypress (*Cupressus goveniana* ssp. *pygmaea* or *Calliptropis pygmaea*), Madrone (*Arbutus menziesii*), Shore Pine (*P. contorta* ssp. *contorta*) and Redwood (*Sequoia sempervirens*).

PO

PORT ORFORD CEDAR ALLIANCE

Port Orford Cedar (*Chamaecyparis* or *Cupressus lawsoniana*) is an endemic conifer of the Klamath Mountains of California and Oregon (Mountains Section). It is often found on moist riparian sites as well as ultramafic soils, especially those derived from serpentinite or periodotite and in mixed conifer-hardwood stands. Due to this cedar's value and its susceptibility to mortality from the spread of a non-native root pathogen (*Phytophthora lateralis*), Port Orford Cedar has been mapped at lower conifer densities within a stand than usual. These highly diverse groves are widespread in nine subsections of the Mountains Section and are rare in the Coast and Coast Ranges Sections (one subsection each). The highest mapped elevations of Port Orford Cedar occurrences in the area are about 5400 feet (1646 m) in the Siskiyou Mountains. At these altitudes, it associates with White Fir (*Abies concolor*), Western White Pine (*Pinus monticola*), Huckleberry Oak (*Quercus vaccinifolia*) and Pinemat Manzanita (*Arctostaphylos nevadensis*). At lower elevations (below about 3000 feet or 915 m), Tanoak (*Lithocarpus*

densiflorus), Douglas-fir (Pseudotsuga menziesii), Pacific Yew (Taxus brevifolia), California Rose-Bay (Rhododendron macrophyllum) and Salal (Gaultheria shallon) often are present in this type. Sites in the middle elevation ranges may have Incense Cedar (Calocedrus decurrens), White Alder (Alnus rhombifolia), Western Azalea (Rhododendron occidentale) or species of Huckleberry (Vaccinium spp.) present.

PP

PONDEROSA PINE ALLIANCE

Ponderosa Pine (Pinus ponderosa) may become a dominant conifer on well-drained, often droughty, non-serpentinized soils, such as coarse-textured alluvial sites and southwest-facing or steep slopes. Typically pure to nearly pure stands occur in scattered patches below the Mixed Conifer - Fir, above the Lower Montane Mixed Chaparral type and adjacent to the Douglas-fir - Ponderosa Pine and Mixed Conifer - Pine types of this region. Ponderosa pine-dominated forests have been identified in the Coast (three subsections), Mountains (nineteen subsections) and Ranges (six subsections) Sections, becoming more abundant towards the south and east. The many minor associates in these open stands include California Black Oak (Quercus kelloggii), Canyon Live Oak (Q. chrysolepis), Oregon White Oak (Q. garryana), Douglas-fir (Pseudotsuga menziesii) and White Fir (Abies concolor) in various regions. Whiteleaf Manzanita (Arctostaphylos viscida) and annual grasses such as Bromus spp. may associate with it on alluvial soils. Wedgeleaf Ceanothus (Ceanothus cuneatus) and Whiteleaf Manzanita (Arctostaphylos viscida) may become important associated shrubs in the Mountains Section. Jeffrey Pine (P. jeffreyi) appears to hybridize with Ponderosa Pine in areas of weakly or moderately serpentinized rock where the two species co-mingle.

PR

MONTEREY PINE ALLIANCE

Monterey Pine (Pinus radiata) has been planted in small areas of the California coast in the Fort Bragg Terraces, Northern and Coastal Franciscan, Coastal Hills - Santa Rosa Plain, Humboldt Bay Flats and Terraces, Marin Hills and Valleys, and Point Reyes Subsections of the Coast Section. This is considerably north of its natural distribution in central coastal California. Although primarily planted as a timber species in other countries, Monterey Pines are planted along the California coast for decorative values as well as serving as windbreaks.

PS

BEACH PINE

Beach (or Shore) Pine (Pinus contorta ssp. contorta) is the coastal subspecies of the Lodgepole Pine, occurring on marine terraces and landward edges of sand dunes from sea level to 492 feet (150 m). It is more common in the Humboldt Bay Flats and Terraces Subsection of the Coast Section than elsewhere in northern California in pure stands, having been mapped below 200 feet (61 m) there. Beach Pine has open non-serotinous cones that persist on the branches for many years, having greater cone longevity than those on Lodgepole Pine (P. c. ssp. murrayana). Trees are usually small, short-lived and thick-barked on the coast. The Bolander Pine (P. c. ssp. bolanderi) may be an edaphic Beach Pine type physically adapted to highly acid nutrient-poor soils of Mendocino shore terraces. Other trees and shrubs such as Sitka Spruce (Picea sitchensis), Coyote Brush (Baccharis pilularis), Red Alder (Alnus rubra), California Huckleberry (Vaccinium ovatum) and Willows (Salix spp.) may occur in Beach Pine stands in minor amounts.

PW

PONDEROSA PINE - WHITE FIR ALLIANCE

Middle montane elevations (4000 - 6000 feet or 1220 - 1830 m) of the Southern Cascades Section (North Interior Calveg zone) often have sites in which Ponderosa Pine (Pinus ponderosa) and White Fir (Abies concolor) become co-dominant conifers. Some of these areas also occur in this zone, but more sparsely. These sites were usually pine-dominated in the past but White Fir is regenerating well at the present time. This type intergrades with the Mixed Conifer - Pine, White Fir and Ponderosa Pine types depending on site conditions and landscape history. This type has been mapped at elevations up to about 6400 feet (1952 m) in eleven subsections of the Ranges and Mountains Sections. The landscape often has a gentle gradient and slope aspects are typically south- or west-facing. Pacific Douglas-fir (Pseudotsuga menziesii), and Red or Shasta Fir (A. magnifica) may also be present in these stands at low canopy cover values. Shrubs are generally sparse due to dense canopy closure, but Greenleaf Manzanita (Arctostaphylos patula), Western Serviceberry (Amelanchier pallida), Snowbrush (Ceanothus velutinus), Bloomer Goldenbush (Ericameria bloomeri) and Creeping Snowberry (Symphoricarpus mollis) may occasionally occur.

RD

REDWOOD - DOUGLAS-FIR ALLIANCE

This mixture of Redwood (Sequoia sempervirens) and Pacific Douglas-fir (Pseudotsuga menziesii) occurs, usually in protected upland slopes up to approximately 3200 feet (976 m) elevation as mapped in fifteen subsections of this zone. The longitudinal

extent of the Redwood - Douglas-fir type is associated with a constant temperature and moisture regime that defines the Redwood fog belt. The eastern limit is determined by environments having more variable temperatures and lower humidity and moisture regimes than Redwood requires for its maintenance. It is especially prominent in the Northern and Coastal Franciscan, Fort Bragg Terraces and Point Arena Subsections of the Coast Section. Associated coastal trees within this type chiefly include Bishop Pine (*Pinus muricata*), Tanoak (*Lithocarpus densiflorus*), Red Alder (*Alnus rubra*), Madrone (*Arbutus menziesii*), California Bay (*Umbellifera californica*) and Oregon White Oak (*Quercus garryana*). California Hazelnut (*Corylus cornuta* var. *californica*) also occurs as an understory shrub in this type.

RF RED FIR ALLIANCE

Red and Shasta Fir (*Abies magnifica* var. *magnifica* and *A. m.* var. *shastensis*) sites occur in nearly pure stands at elevations above about 4400 feet (1342 m) in the higher montane areas of the Mountains and Ranges Sections. Either of these conifers have been mapped together as dominant type(s) in twenty subsections of this zone, being especially prominent in the Siskiyou Mountains, Upper Scott Mountains, Red Butte, North Trinity Mountain and Trinity Alps Subsections. Higher elevation conifers such as Mountain Hemlock (*Tsuga mertensiana*), Brewer Spruce (*Picea breweriana*), Western White Pine (*Pinus monticola*) and Whitebark Pine (*P. albicaulis*) may be found in association with Red Fir above 7000 feet (2170 m). At lower elevations, Red Fir mixes more with White Fir (*A. concolor*); it hybridizes and associates with Noble Fir (*A. procera*) in the Siskiyou and Klamath Mountains. Understory shrub species in this type include Huckleberry Oak (*Quercus vaccinifolia*), Bush Chinquapin (*Chrysolepis sempervirens*) and Snowberry (*Symphoricarpus mollis*). Moist locations have more Mountain Maple (*Acer glabrum*) and Dogwood (*Cornus* spp.) but shrubs, especially in dense Red Fir stands, rarely occur in this type. However, Pinemat Manzanita (*Arctostaphylos nevadensis*), Greenleaf Manzanita (*A. patula*), Snowbrush (*Ceanothus velutinus*) and Sadler Oak (*Q. sadleriana*) may be present on more open sites, especially towards the northwest.

RW REDWOOD ALLIANCE

Redwood (*Sequoia sempervirens*) occurs on alluvial flats, streamside terraces and colluvial slopes, generally within a narrow coastal strip within eleven subsections of the Coast Section and sparsely within two other subsections. In the northern portions of the Coast Franciscan Subsection, however, the type occupies sites further inland but which are still within the maritime influence. Elevations are typically below 2400 feet (732 m). Old-growth Redwood groves are mostly contained in national parks, state parks, and regional or private preserves. Soils underlying these sites are often a result of sediment deposition from continuous river flooding. Redwood Sorrel (*Oxalis oregana*) and Western Sword Fern (*Polystichum munitum*) are typical understory herbs in undisturbed groves. Other common associates are Pacific Douglas-fir (*Pseudotsuga menziesii*), Red Alder (*Alnus rubra*), Salal (*Gaultheria shallon*), Tanoak (*Lithocarpus densiflorus*), Western Hemlock (*Tsuga heterophylla*), California Hazelnut (*Corylus cornuta* var. *californica*) and California Rose-Bay (*Rhododendron macrophyllum*). The Redwood groves are geographically located in the coastal fog belt and are adjacent to Redwood – Douglas-fir, Sitka Spruce - Redwood, and Sitka Spruce forests.

SA SUBALPINE CONIFER ALLIANCE

A mixture of conifers may be found at the higher elevations, commonly above 5600 feet (1708 m) in this area, in which no single species is dominant. This subalpine type has been identified in the Trinity Alps, Upper Scott Mountains, and Upper Salmon Mountains Subsections of the Mountains Section and less conspicuously in this and the Ranges Sections. Combinations of Mountain Hemlock (*Tsuga mertensiana*), Foxtail Pine (*Pinus balfouriana*), Red or Shasta Fir (*Abies magnifica* var. *magnifica* and *A. m.* var. *shastensis*), Western White Pine (*P. monticola*), Lodgepole Pine (*P. contorta* ssp. *murrayana*) and Whitebark Pine (*P. albicaulis*) are in the conifer mixture in various combinations. Stands are often open with shrub associates such as Pinemat Manzanita (*Arctostaphylos nevadensis*), Huckleberry Oak (*Quercus vaccinifolia*) and Curlleaf Mountain Mahogany (*Cercocarpus ledifolius*) in the east and Bush Chinquapin (*Chrysolepis sempervirens*) on the drier sites. Mesic sites have more Mountain Maple (*Acer glabrum*) and Thinleaf Huckleberry (*Vaccinium membranaceum*) at their lower elevations. These stands are often interspersed with bare areas or alpine forb or shrub communities.

SG SITKA SPRUCE - GRAND FIR ALLIANCE

This type occurs in the Coast Section where Sitka Spruce (*Picea sitchensis*) and Grand Fir (*Abies grandis*) overlap within the same northern coastal areas of California. These conifers intermingle within ten miles (16km) of the coast in Humboldt and Del Norte Counties and occur adjacent to Redwood (*Sequoia sempervirens*) groves where coastal salt spray depositions are detrimental to vigorous Redwood growth. Grand Fir continues as a single dominant conifer in its own type in Mendocino and Sonoma counties to the south. Douglas-fir (*Pseudotsuga menziesii*) and Western Hemlock (*Tsuga heterophylla*) also often

occur in this type. This aggregate of low-elevation conifer species usually occurs on coastal terraces, alluvial soils, or sandy benches adjacent to streams at elevations below about 1600 feet (488 m). Associated riparian hardwoods include Black Cottonwood (*Populus balsamifera* ssp. *trichocarpa*), Bigleaf Maple (*Acer macrophyllum*) and Red Alder (*Alnus rubra*). Western Trillium (*Trillium ovatum*) and Salal (*Gaultheria shallon*) also are common in the understory.

SK

SITKA SPRUCE ALLIANCE

Sitka Spruce (*Picea sitchensis*) becomes a dominant conifer along certain fog-influenced coastal and near-coastal stretches of Humboldt and Del Norte Counties within six subsections of the Coast Section. This narrow strip often is underlain by alluvial or sandy stream floodplain deposits and supports wetland plants such as Red Alder (*Alnus rubra*), Yellow Skunk Cabbage (*Lysichiton americanum*) and Sedges (*Carex* spp.). This spruce mixes with Redwoods (*Sequoia sempervirens*) further inland or on slightly higher ground but where it achieves conifer dominance, it has been mapped at elevations below about 1200 feet (366 m). In Mendocino County, Beach Pine (*Pinus contorta* ssp. *contorta*) associates with Sitka Spruce on coastal sand dunes in the Fort Bragg Terraces Subsection of this Section. Grand Fir (*Abies grandis*) may be present in Sitka Spruce stands in the Humboldt Bay Flats and Terraces Subsection in Humboldt County. Other common associates of the Sitka Spruce-dominated type include the shrubs Salmonberry (*Rubus spectabilis*), Thimbleberry (*R. parviflorus*), Huckleberry (*Vaccinium* spp.), Salal (*Gaultheria shallon*) and Vine Maple (*Acer circinatum*), forbs such as Western Sword Fern (*Polystichum munitum*), and hardwoods such as Bigleaf Maple (*A. macrophyllum*).

SR

SITKA SPRUCE - REDWOOD ALLIANCE

Sitka Spruce (*Picea sitchensis*) associates with Redwood (*Sequoia sempervirens*) mainly in coastal sites of the Crescent City Plain, Northern, Central and Coastal Franciscan, and Humboldt Flats and Terraces Subsections of the Coast Section. These areas are usually west of the main Redwood forests and east of the Sitka Spruce and Sitka Spruce - Grand Fir forested regions with the exception of the northern Central Franciscan Subsection. Species in this type are typical of coastal coniferous forests of northern California, including Sword Fern (*Polystichum munitum*), Salal (*Gaultheria shallon*), California Rose-Bay (*Rhododendron macrophyllum*), Red Alder (*Alnus rubra*), California Hazelnut (*Corylus cornuta* var. *californica*), Pacific Madrone (*Arbutus menziesii*), and Tanoak (*Lithocarpus densiflorus*). Mapped elevations of these stands are below about 1000 feet (305 m).

WB

WHITEBARK PINE ALLIANCE

Whitebark Pine (*Pinus albicaulis*) has a wide-ranging distribution in the Cascades, Rocky Mountains, Sierra Nevada and Klamath Mountains from British Columbia and Alberta into California and east to Wyoming. It becomes the primary upper timberline conifer of exposed and windy, often northerly ridges in the vicinity of 7000 – 9500 feet (2135 – 2898 m) in this zone. These areas occur in the Trinity Alps, Marble Mtns., Scott Mtns., China Mtns., and the Eddies in five subsections of the Mountains Section on usually very open rocky sites having little other vegetation cover. Red Fir (*Abies magnifica*) and Mountain Hemlock (*Tsuga mertensiana*) may occasionally be found at the lower elevations of this type. The Whitebark Pine type grades into the Subalpine Conifer mixture where greater species diversity exists on more protected sites.

WF

WHITE FIR ALLIANCE

Sites dominated by White Fir (*Abies concolor*) in the conifer overstory and understory occur broadly in all twenty subsections of the Mountains Section, prominently in the Eastern Franciscan Subsection of the Ranges Section, and sparsely in two other subsections. Elevations are usually below 7000 feet (2170 m), being lowest towards the west. The White Fir type usually is found below Red Fir and above Mixed Conifer - Fir forests. Douglas-fir (*Pseudotsuga menziesii*) and Red Fir (*A. magnifica*) may be common associates at lower and upper elevations, respectively. Understory shrubs and hardwoods are uncommon due to the density of these stands. Shrubs of the Upper Montane Mixed Chaparral and Shrub Alliances may occasionally be present in forest openings, including Huckleberry Oak (*Quercus vaccinifolia*), Pinemat Manzanita (*Arctostaphylos nevadensis*), Bush Chinquapin (*Chrysolepis sempervirens*), Greenleaf Manzanita (*A. patula*), Mountain Whitethorn (*Ceanothus cordulatus*), Brewer Oak (*Q. garryana* var. *breweri*), Bitter Cherry (*Prunus emarginata*) and on moist sites, Mountain Alder (*Alnus incana* ssp. *tenuifolia*).

WJ

WESTERN JUNIPER ALLIANCE

Areas in which Western Juniper (Juniperus occidentalis var. occidentalis) is the dominant conifer occur sparsely in two subsections of the Ranges Section, three other subsections of the Mountains Section and more abundantly in the Duzel Rock Subsection (Mountains Section) of this zone. As its main distribution is within the North Interior Calveg zone, this type becomes more common east of the Scott River and in the rainshadow of the Siskiyou and Marble Mountains. Typical associated species include Ponderosa Pine (Pinus ponderosa), Douglas-fir (Pseudotsuga menziesii), Oregon White Oak (Quercus garryana), and Wedgeleaf Ceanothus (C. cuneatus) in these eastern sites. Mapped elevations are in the range 2600 – 5600 feet (792 – 1708 m).

WW

WESTERN WHITE PINE ALLIANCE

Western White Pine (Pinus monticola) is a resilient species that occupies a variety of different sites. Conifer stands in which it becomes dominant are often found on rocky, south-facing upper montane elevations in the vicinity of 6000 - 7000 feet (1830 - 2135 m) in the Trinity Alps and elsewhere, where it usually a tall tree. Pinemat Manzanita (Arctostaphylos nevadensis) and Red Fir (Abies magnifica) are common associates on these sites. This pine also occurs more abundantly as a dominant conifer at lower elevations on ultramafic soils, being especially common in the Gasquet Mountain Ultramafic Subsection in the Mountains Section, where it is typically less robust or even stunted from the adverse edaphic conditions. On these sites, it forms a component of the Ultramafic Mixed Conifer type in association with conifers such as Jeffrey Pine (P. jeffreyi), Incense Cedar (Calocedrus decurrens) and Lodgepole Pine (P. contorta ssp. murrayana) and shrubs such as Huckleberry Oak (Quercus vaccinifolium), generally at elevations below about 4600 feet (1402 m).

HARDWOOD FOREST/WOODLAND

EX

COASTAL MIXED HARDWOODS ALLIANCE

This alliance is the southerly and westernmost of several upland mixed hardwoods types in this region that have no single dominant hardwood species. It occurs sparsely in the San Pablo Bay Flats, Coastal Hills – Santa Rosa Plain, Marin Hills and Valleys and Mount St. Helena Flows and Valleys Subsections of the Coast Section and in the Central Franciscan Subsection of the Ranges Section below about 2000 feet (610 m). Indicator species of this type are principally Coast Live Oak (Quercus agrifolia), California Bay (Umbellifera californica) and Oregon White Oak (Q. garryana). Conifers occurring in minor amounts may include Gray Pine (Pinus sabiniana) and Ponderosa Pine (P. ponderosa).

NR

RIPARIAN MIXED HARDWOOD ALLIANCE

The Riparian Mixed Hardwood Alliance describes the mixture of tree Willows (Salix spp.), Cottonwoods (Populus spp.), White and Red Alders (Alnus rhombifolia, A. rubra) and other tree species where none are dominant. In most cases, at least three genera are present in the mixture. These species occur in moist areas and adjacent to stream courses in coastal and inland areas in twenty-five subsections of the Coast and Mountains Sections, having been mapped widely but sparsely up to an elevation of about 5800 feet (1768 m) in this zone. These sites are most often found adjacent to upland lower montane conifers such as Douglas-fir (Pseudotsuga menziesii), Gray Pine (P. sabiniana), and Ponderosa Pine (P. ponderosa) and in the west, Redwood (Sequoia sempervirens) and hardwoods such as various oaks (Quercus spp.) and Tanoak (Lithocarpus densiflorus).

NX

INTERIOR MIXED HARDWOOD ALLIANCE

No single species is dominant in the Interior Mixed Hardwood Alliance, a mixture that has been mapped most extensively in the Central Franciscan and Ultrabasic Complex Subsections of the Mountains Section and the Mount St. Helena Flows and Valleys, Coast Franciscan and Marin Hills and Valleys Subsections of the Coast Section. It also occurs with less abundance in thirteen other subsections in all three sections. The mixture in this area includes diverse proportions of Oregon White (Quercus garryana), Canyon Live (Q. chrysolepis) and Blue (Q. douglasii) Oaks, with lesser amounts of California Bay (Umbellifera californica) and Coast Live Oak (Q. agrifolia). Conifer associates are mainly Douglas-fir (Pseudotsuga menziesii) and in western areas, Redwood (Sequoia sempervirens). This alliance has been mapped at elevations generally below about 4000 feet (1220 m). Annual grasses and forbs typically occur in these open sites.

QA

COAST LIVE OAK ALLIANCE

This type, dominated by Coast Live Oak (*Quercus agrifolia*), can be found on low elevation dry coastal or mesic inland slopes south of Mendocino County in the Coast and Ranges Sections. Pure Coast Live Oak hardwood stands have been mapped in southern areas of this zone within eight subsections at elevations less than about 2800 feet (854 m). Annual grasses typically form the understory in these open stands. The oak also occurs occasionally as an understory tree in Douglas-fir (*Pseudotsuga menziesii*) and Gray Pine (*Pinus sabiniana*) stands in the Ranges Section. Along with several other hardwoods such as California Bay (*Umbellularia californica*) and Oregon White Oak (*Q. garryana*) it is a major component of the Coastal Mixed Hardwood type of this area.

QB

CALIFORNIA BAY ALLIANCE

This woodland type is almost completely composed of California Bay (*Umbellularia californica*). It occurs in scattered small stands, generally away from the immediate coast on exposed slopes and ridges from the Oregon border southward below about 3000 feet (915m) in eleven subsections in the Coast and three subsections of the Ranges Sections. California Bay also is adapted to seawinds of coastal environments, especially towards the south. For example, this type has been mapped extensively in the Marin Hills and Valley Subsection (Coast), where it associates with trees and shrubs such as Redwood (*Sequoia sempervirens*), Douglas-fir (*Pseudotsuga menziesii*), Tanoak (*Lithocarpus densiflorus*) and Coyote Bush (*Baccharis pilularis*) near the coast. Other hardwoods such as Canyon and Coast Live Oaks (*Quercus chrysolepis*, *Q. agrifolia*) may be found in these stands further inland. Tree Chinquapin (*Chrysolepis chrysophylla*), Berries (*Rubus* spp.), and species of *Ceanothus* may also occur as minor associates of this type.

QC

CANYON LIVE OAK ALLIANCE

Canyon Live Oak (*Quercus chrysolepis*), a wide-ranging hardwood that is distributed from Oregon to Baja California, may develop relatively pure tree (*Q. c.* var. *chrysolepis*) stands on steep and rocky montane slopes. Elevations of this type range up to about 6000 feet (1830 m) as mapped in the three sections. These stands have been mapped abundantly in seven subsections and more sparsely in twenty-five subsections across this zone. Slopes are often south- or southwest-facing. Associated trees typically include low- to mid-elevation conifers such as Douglas-fir (*Pseudotsuga menziesii*), Gray Pine (*Pinus sabiniana*), Ponderosa Pine (*P. ponderosa*), Knobcone Pine (*P. attenuata*) and Redwood (*Sequoia sempervirens*). Hardwoods such as Oregon White Oak (*Q. garryana*), California Black Oak (*Q. kelloggii*) and Tanoak (*Lithocarpus densiflorus*) readily mix in stands with this oak, especially in the several mixed hardwood alliances.

QD

BLUE OAK ALLIANCE

Blue Oak (*Quercus douglasii*) dominates this low elevation interior hardwood type, which generally occurs below about 2700 feet (820 m) as identified in fifteen subsections in the three sections of this zone. This type has been mapped most abundantly in the Clear Lake Hills and Valleys, Konocti Flows and Ultrabasic Complex Subsections of the Ranges Section. It grades into the Gray Pine (*Pinus sabiniana*) type at its higher elevations. Other typical associates include Oregon White Oak (*Q. garryana*), California Black Oak (*Q. kelloggii*), low elevation shrubs such as Chamise (*Adenostoma fasciculatum*), shrub Oaks (*Quercus* spp.) and annual and perennial grasses.

QE

WHITE ALDER ALLIANCE

White Alder (*Alnus rhombifolia*) replaces Red Alder (*A. rubra*) on inland riparian sites of this region up to an elevation of about 5500 feet (1678 m). This type typically occurs in well-aerated, rapidly flowing perennial streams of incised, steep-sided canyons which usually have coarse-textured alluvial deposits. It has been identified sparsely in seventeen subsections scattered across the three sections of this zone. Pacific Douglas-fir (*Pseudotsuga menziesii*), California Bay (*Umbellularia californica*) and Tanoak (*Lithocarpus densiflorus*) may occur as minor tree components in this alliance. Shrubs such as California Wild Rose (*Rosa californica*), Mule Fat (*Baccharis salicifolia*), Poison Oak (*Toxicodendron diversilobum*) and Snowberry (*Symphoricarpos* spp.) are likely to be present in White Alder stands. The Mountain (or Thinleaf Alder) dominated stands (*A. incana* ssp. *tenuifolia*) usually are found in higher-elevation riparian or very wet interior regions.

QF

FREMONT COTTONWOOD ALLIANCE

Stands dominated by Fremont Cottonwood (Populus fremontii) occur in limited riparian areas of this zone. This Alliance has been mapped in small patches along the Russian River in the Central Franciscan Subsection of the Ranges Section and within seven other subsections of the three sections. Shrubby or tree-sized Willows (Salix spp.) may be present. Agricultural uses, especially vineyards, are often adjacent to this type in this zone.

QG

OREGON WHITE OAK ALLIANCE

Oregon White Oak (Quercus garryana) is widely distributed from British Columbia to this zone, with outlying scattered populations further east and south to the Sierra Nevada Mountains and southern California. The tree form (Q. g. var. garryana) becomes a local canopy dominant in woodlands of the three sections of this zone across thirty-one subsections, becoming especially prominent in seven of them. Mapped elevations of this type are usually below about 5800 feet (1768 m). Often developing on poor, exposed or droughty soils in inland valleys, foothills or rocky ridges, the Oregon White Oak type also is found in poorly drained areas having occasional standing water or next to stream terraces. On better sites, it is usually out-competed by species such as Douglas-fir (Pseudotsuga menziesii) and California Black Oak (Q. kelloggii), often becoming a minor element in mixed hardwood types. Other associated species include other conifers such as Ponderosa Pine (Pinus ponderosa), Gray Pine (P. sabiniana) and Western Juniper (Juniperus occidentalis var. occidentalis), various Oaks (Quercus spp.), Wedgeleaf Ceanothus (Ceanothus cuneatus), Chamise (Adenostoma fasciculatum), and especially in recently burned areas, Deerbrush (Ceanothus integriramus). Open sites often have a grass understory. The shrub form, Brewer Oak (Quercus garryana var. breweri), usually occupies higher elevations on shallow soils (see Brewer Oak Alliance).

QH

MADRONE ALLIANCE

Sites dominated by dense stands of Pacific Madrone (Arbutus menziesii) are rarely found except on relatively dry or steep sites at some distance from the immediate coast of northern California. This type has been mapped scattered over five subsections in the three sections. Pacific Madrone is a common but minor component of the shaded understory or lower canopy of Redwood, Douglas-fir or mixed hardwoods forests, but usually does not reach its best development there. Within the Central Franciscan Subsection of the Ranges Section, for example, the Madrone type occurs at low to moderate elevations below 3200 feet (976 m) on steep slopes of any aspect. It is often associated with Oregon White Oak (Quercus garryana) and chaparral shrubs such as Chamise (Adenostoma fasciculatum) in interior locations. A prolific sprouter from underground burls, Pacific Madrone occupies stand-replacing fire sites rapidly, especially under conditions of bare mineral or shallow soils with limited canopy cover. Conditions become less favorable for its maintenance in dense stands as the canopy closes.

QI

CALIFORNIA BUCKEYE ALLIANCE

California Buckeye (Aesculus californica), a small tree, may occasionally be found in pure or nearly pure stands in northern California up to an elevation of about 3000 feet (915 m). It has been identified in very limited areas and is scattered among two subsections of the Coast Sections and four subsections of the Ranges Section. These sites are often shaded. Species such as Poison Oak (Toxicodendron diversilobum), California Bay (Umbellularia californica), Canyon Live Oak (Quercus chrysolepis), shrub Oaks (Quercus spp.), Chamise (Adenostoma fasciculatum), and Manzanitas (Arctostaphylos spp.) may be associated with these stands. Soils on these sites tend to be relatively coarse-textured sandy or gravelly loams.

QJ

COTTONWOOD - ALDER ALLIANCE

Two riparian deciduous trees dominate the hardwoods component of this alliance, chiefly Fremont Cottonwood (Populus fremontii) and White Alder (Alnus rhombifolia) in this zone. Other minor components such as Valley Oak (Quercus lobata) and arboreal Willows (Salix spp.) may also be present in this mixture. This type has been mapped scattered among three subsections of the Mountains Section at elevations between about 1400 – 3400 feet (427 – 1036 m). Upland associated trees include Douglas-fir (Pseudotsuga menziesii) and Ponderosa Pine (Pinus ponderosa).

QK

CALIFORNIA BLACK OAK ALLIANCE

California Black Oak (Quercus kelloggii) occurs extensively in this zone at elevations up to about 6000 feet (1830 m). It has been mapped abundantly as a dominant hardwood in the Eastern Klamath Mountains and Oregon Mountain Subsections (Mountains Section) and in the Eastern and Central Franciscan and Konocti Flows Subsections (Ranges Section) and scattered

among twenty-five other subsections in the three sections. It may develop into relatively pure stands on moderately steep slopes or may associate with Oregon White Oak (*Q. garryana* var. *garryana*) and/or Canyon Live Oak (*Q. chrysolepis*) on drier or harsher sites. These stands are commonly found within or below the Douglas-fir (*Pseudotsuga menziesii*), Mixed Conifer - Pine and Ponderosa Pine (*Pinus ponderosa*) types, often as a result of fire or other disturbance, especially in Douglas-fir areas. Black Oak commonly is a major understory hardwood in those conifer types and also typically grows on better soils than those of the Canyon Live Oak-dominant type. Commonly associated shrubs include both upper and lower montane species such as various Manzanitas (*Arctostaphylos* spp.), shrub Oaks (*Quercus* spp.), Deerbrush (*Ceanothus intergerimus*), Brewer Oak (*Q. garryana* var. *breweri*), Wedgeleaf Ceanothus (*C. cuneatus*), etc.

QL

VALLEY OAK ALLIANCE

Valley Oak (*Quercus lobata*) occurs in scattered occurrences in foothill woodlands, valleys and floodplains west of the Sacramento River and on gentle, low elevation montane slopes from Marin and Napa Counties to Mendocino County in this zone. The Valley Oak-dominated type has been identified mainly in six subsections of the Ranges Section, but also occurs sparsely in four subsections of the Coast and three subsections of the Mountains Sections. The oak is known to occur in California up to about 5600 feet (1700 m) elevation but has been mapped as a dominant hardwood type up to about 3400 feet (1036 m). It is considered a species of concern due to habitat loss and specific germination requirements. Associated minor species within the type include Blue Oak (*Quercus douglasii*), Oregon White Oak (*Q. garryana*), low elevation shrubs such as Chamise (*Adenostoma fasciculatum*) and annual grasses.

QM

BIGLEAF MAPLE ALLIANCE

Bigleaf Maple (*Acer macrophyllum*) is a commonly occurring tree in moist or shaded areas of northwestern California and northward. However, it is not often found in pure hardwood stands in this zone, although it has been mapped as a dominant type broadly in twenty subsections in the three sections. These sites are generally found at elevations lower than about 4600 feet (1402 m). It is closely associated with Douglas-fir (*Pseudotsuga menziesii*) in these stands and with the shrubs Pacific Dogwood (*Cornus nuttallii*) and California Hazelnut (*Corylus cornuta* var. *californica*). Boxelder (*Acer negundo*), White Alder (*Alnus rhombifolia*) and Black Cottonwood (*Populus balsamifera* ssp. *trichocarpa*) are sometimes found in this type as well. These are either well-shaded or riparian areas that maintain moisture during the warm season.

QO

WILLOW ALLIANCE

This stringer-like riparian type is dominated by tree-sized Willows of any species (*Salix* spp.) in riparian floodplains, seeps, springs, swamps or dry washes of the Mountains, Coast and Ranges Sections in this area. It has been mapped sparsely but widespread within thirty-one subsections at elevations up to about 3400 feet (1036 m). The more common species include Scouler's (*S. scouleriana*), Arroyo (*S. lasiolepis*), Hooker (*S. hookeriana*), Sitka (*S. sitchensis*), Black (*S. goodingii*), and Red (*S. laevigata*) Willows. Willows dominate these areas to the exclusion of other riparian species but other species such as Cottonwoods (*Populus* spp.), and White or Red Alder (*Alnus rhombifolia*, *A. rubra*) may occur in small amounts. Species of Gooseberry and Currant (*Ribes* spp.), Blackberry and other edible berries (*Rubus* spp.), Wild Rose (*Rosa* spp.) and Poison Oak (*Toxicodendron diversilobum*) also may occur sparsely in this type, but not as obligate hydrophytes. The herbaceous layer is primarily Sedges (*Carex* spp.) and numerous grasses and forbs.

QQ

QUAKING ASPEN ALLIANCE

Quaking (or Trembling) Aspen (*Populus tremuloides*) occurs westward of its Rocky Mountain and upper midwest distribution in relict, scattered stands in this region. Within the Mountains Section, it has been mapped very sparsely in the Upper Salmon Mountains Subsection at elevations below about 6800 feet (2074 m). In this area, Red Fir (*Abies magnifica*) is a common conifer associate. The understory often includes numerous grasses and forbs such as Kentucky Bluegrass (*Poa pratensis*), Redtop (*Agrostis* spp.), Timothy (*Phleum pratense*), Clover (*Trifolium* spp.), Cinquefoil (*Potentilla* spp.), and a variety of Sedges (*Carex* spp.).

QR

RED ALDER ALLIANCE

Seasonally flooded or permanently saturated soils may develop stands dominated by Red Alder (*Alnus rubra*) in alluvial or upland positions of this zone. Red Alder often occurs in dense stands on mesic slopes in Humboldt and Del Norte Counties and further south in nine subsections of the Coast Section. It is found mainly in the Smith, Trinity and Klamath River

watersheds to an elevation of about 3000 feet (915 m). These pure stands are intermingled with conifers such as Redwood (*Sequoia sempervirens*), Douglas-fir (*Pseudotsuga menziesii*), Sitka Spruce (*Picea sitchensis*), and Grand Fir (*Abies grandis*). Short-lived Red Alder stands may develop after low-elevation logging operations accompanied by minor amounts of other hardwoods such as Bigleaf Maple (*Acer macrophyllum*) and Oregon Ash (*Fraxinus latifolia*). Shrubs and non-woody species such as Chain Fern (*Woodwardia fimbriata*), Spikenard (*Aralia californica*), Western Burning Bush (*Euonymus occidentalis*), American Dogwood (*Cornus sericea*), Sitka Alder (*A. virdis*) and Vine Maple (*Acer circinatum*) are occasionally also found. White Alder (*Alnus rhombifolia*) mixes with or replaces Red Alder on inland sites.

QT

TANOAK (MADRONE) ALLIANCE

The Tanoak (Madrone) Alliance is an association of Tanoak (*Lithocarpus densiflorus*) with or without a Pacific Madrone (*Arbutus menziesii*) component. It is a very common type in this zone at elevations below about 4600 feet (1402 m) where soils and climate are sufficiently but not excessively moist. Tanoak forms extensive, nearly pure closed-crown hardwood forests in the western, moister regions of the Coast Section, such as in the Northern and Coastal Franciscan Subsections, in the Western Jurassic and Rattlesnake Creek Subsections (Mountains Section) and the Central Franciscan Subsection (Ranges Section). It also has been mapped broadly in fourteen other subsections. These stands are usually adjacent to Douglas-fir (*Pseudotsuga menziesii*) sites and are associated with hardwoods such as Oregon White (*Quercus garryana*) and Canyon Live Oaks (*Q. chrysolepis*). In many cases, however, the shrub and herbaceous layers tend to be depauperate due to a dense Tanoak canopy.

QW

INTERIOR LIVE OAK ALLIANCE

The Interior Live Oak (*Quercus wislizenii*) Alliance occurs mainly in southern areas of the Coast and Mountains Sections as mapped in eight subsections. It is often found to the north and east of the Coast Live Oak (*Q. agrifolia*) Alliance distribution and topographically above Blue Oak (*Q. douglasii*) dominated stands towards the east. This type often indicates xeric or rocky sites when associated with other hardwood types and has been mapped at elevations up to about 4400 feet (1342 m). The shrubby form (*Q. wislizenii* var. *frutescens*) may also dominate a site, especially in areas of frequent fires. Occasional trees and shrubs such as Douglas-fir (*Pseudotsuga menziesii*), Gray Pine (*Pinus sabiniana*), Blue Oak (*Q. douglasii*), Oregon White Oak (*Q. garryana*) and Chamise (*Adenostoma fasciculatum*) may be associated with this pure hardwood alliance. Interior Live Oak is known to hybridize with California Black Oak (*Q. kelloggii*) and Coast Live Oak (*Q. agrifolia*), occasionally making field identification more difficult.

QX

BLACK COTTONWOOD ALLIANCE

Black Cottonwood (*Populus balsamifera* ssp. *trichocarpa*) occurs in certain riparian areas in this zone, particularly along the Eel River drainage. Many of these areas are too small to map although this type has been mapped sparsely in six subsections in the three sections at elevations up to about 4400 feet (1342 m). Being shade intolerant, Black Cottonwood requires freshly deposited alluvial materials for its maintenance and stands are often even-aged as a result of episodic flood events. Tree and shrub Willows (*Salix* spp.), Oregon Ash (*Fraxinus latifolia*), Red and White Alders (*Alnus rubra*, *A. rhombifolia*) are sometimes present in this type. Very old stands may become dominated by shade tolerant coastal conifers such as Sitka Spruce (*Picea sitchensis*), Grand Fir (*Abies grandis*) or Western Hemlock (*Tsuga heterophylla*) with Black Cottonwood under the conifer canopy. Shrubs such as Vine Maple (*Acer circinatum*), Hawthorn (*Crataegus* spp.) and herbaceous plants such as Coast Nettle (*Urtica californica*) may be present as well. Black Cottonwood is replaced by Fremont Cottonwood (*P. fremontii*) in this region towards the south and east. At higher elevations and towards eastern California, Black Cottonwood occurs in association with Quaking Aspen (*P. tremuloides*) and White Alder (*A. rhombifolia*).

QY

WILLOW - ALDER ALLIANCE

This type includes any species of tree-sized Willow (*Salix* spp.) combined with tree-sized White, Red or Mountain Alders (*Alnus rhombifolia*, *A. rubra*, *A. incana* ssp. *tenuifolia*) occurring together in stream or seepage areas where neither is clearly dominant in the riparian mixture. It usually occurs in riparian areas scattered throughout seven subsections in the three sections of this zone at elevations up to about 6200 feet (1890 m). Common associates include species of Gooseberry and Currant (*Ribes* spp.), Blackberry and other edible berries (*Rubus* spp.), Wild Rose (*Rosa* spp.), Poison Oak (*Toxicodendron diversilobum*), various graminoids and forbs, Coyote Bush (*Baccharis pilularis*) and Fremont Cottonwood (*Populus fremontii*).

QZ

EUCALYPTUS ALLIANCE

Several species of Eucalyptus have been planted extensively in California, especially Blue Gum (*E. globulus*) and Red Gum (*E. camaldulensis*), very often within or at the edges of agricultural fields or along roads or other developed landscapes. In the San Francisco Bay area, Silver-leaved Gum (*E. pulverulenta*) and Silver Dollar Gum (*E. polyanthemos*) are also occasionally planted. Many widely scattered groves occur within nine subsections of the Coast Section, being especially prominent in the Marin Hills and Valleys, and Mount St. Helena Flows and Valleys Subsections. Many of these stands have become naturalized and mono-specific, since gums develop thick litter beds of exfoliated bark and leaves that do not decompose readily and that are detrimental to the establishment of other species. These sites are notoriously flammable.

TC

TREE CHINQUAPIN ALLIANCE

Tree Chinquapin (*Chrysolepis chrysophylla*) may become a dominant tree in small local areas in moist upland sites, often with deeper soils, but also may persist in more shrubby forms on relatively xeric sites further inland. This type is not as widespread as other mixed evergreen hardwood types such as Tanoak (*Lithocarpus densiflorus*), but has been mapped sparsely in two subsections of the Ranges Section and in nine subsections of the Mountains Section up to an elevation of approximately 6200 feet (1890 m). Often occurring on very steep slopes, it is characterized by the presence of sparse Douglas-fir (*Pseudotsuga menziesii*) and occasionally by Sugar Pine (*Pinus lambertiana*) in the upper canopy and often forms an understory in Douglas-fir stands as a mixed conifer-hardwood type. These productive sites often contain small tree specimens of Tanoak (*Lithocarpus densiflorus*) or Canyon Live Oak (*Quercus chrysolepis*) in the hardwood understory layer, a dense cover of Salal (*Gaultheria shallon*) in the shrub layer and Beargrass (*Xerophyllum tenax*) commonly in the herbaceous layer. Near-coastal sites often have moderately acid soils. Tree Chinquapin may be major component of a mixture of understory shrubs and small trees including Huckleberry Oak (*Q. vaccinifolia*), Red Huckleberry (*Vaccinium parvifolium*), Deerbrush (*Ceanothus integririmus*), Snowbrush (*C. velutinus*), Pacific Dogwood (*Cornus nuttallii*), and California Hazelnut (*Corylus cornuta* var. *californica*).

TX

MONTANE MIXED HARDWOOD ALLIANCE

The Montane Mixed Hardwood Alliance is a combination of three or more hardwoods species such as Black Oak (*Quercus kelloggii*), Tanoak (*Lithocarpus densiflorus*), Red Alder (*Alnus rubra*), Tree Chinquapin (*Chrysolepis chrysophylla*) and Madrone (*Arbutus menziesii*). These species usually indicate sites productive of commercially harvestable conifers due to edaphic, climatic, hydrologic, elevation or other favorable site conditions. Other hardwood species may be part of the mixture, such as Canyon, Coast, and Interior Live Oaks (*Q. chrysolepis*, *Q. agrifolia*, *Q. wislizenii*); Oregon White Oak (*Q. garryana*), California Bay (*Umbellularia californica*), California Buckeye (*Aesculus californica*), Valley Oak (*Q. lobata*) and Blue Oak (*Q. douglasii*) but they are a minority of the composition. This type has been mapped abundantly in four subsections of the Ranges Section, occasionally in seven subsections of the Coast and sixteen subsections of the Mountains Sections in a wide range of elevations up to about 5600 feet (1708 m). This alliance often occurs adjacent to or as understory to Pacific Douglas-fir (*Pseudotsuga menziesii*) at its lower elevations and to mixed conifer forests somewhat higher. It is also found adjacent to the Redwood - Douglas-fir Alliance in the west and as an understory to other conifers such as pure Redwood (*Sequoia sempervirens*) stands and more rarely under the canopy of pure Ponderosa Pine (*Pinus ponderosa*) stands. Occasionally it occurs in proximity to shrubs in the upper and lower montane chaparral types such as Chamise (*Adenostoma fasciculatum*), shrub Oaks (*Quercus* spp.) and Greenleaf Manzanita (*Arctostaphylos patula*), agricultural or dry grasslands.

WD

DOGWOOD ALLIANCE

Mountain or Pacific Dogwood (*Cornus nuttallii*) is a small, deciduous and shade-tolerant tree that occurs from British Columbia to southern California in moist slopes and in riparian areas. In this zone, Mountain Dogwood occasionally forms a hardwood understory in coniferous forests and has been mapped very sparsely in White Fir (*Abies concolor*) and Douglas-fir (*Pseudotsuga menziesii*) mixed forests. These mid-elevation sites occur in the Siskiyou Mountains, Upper Salmon Mountains and Red Butte Subsections of the Mountains Section.

SHRUBS AND CHAPARRAL

AN

PYGMY (FORT BRAGG) MANZANITA ALLIANCE

Pygmy or Fort Bragg Manzanita (*Arctostaphylos mendocinoensis*, formerly part of the *Arctostaphylos nummularia* complex) has a very limited range in coastal areas of Mendocino County, mainly in the Coastal Franciscan, Coastal Hills – Santa Rosa Plain and Fort Bragg Terraces Subsections of the Coast Section. Elevations are generally low (below 660 feet or 200 m) and soils are usually acidic. This low shrub, usually growing to a height of 2 feet (.6 m) or less, may become a dominant shrub form in the more open dwarf coniferous forest ("pygmy forest") sites in this area. Associated species include Pygmy Cypress (*Cupressus goveniana* ssp. *pygmaea* or *Calliptrosis pygmaea*), Bolander Pine (*Pinus contorta* ssp. *bolanderi*), Redwood (*Sequoia sempervirens*), Douglas-fir (*Pseudotsuga menziesii*), Bishop Pine (*P. muricata*), and California Huckleberry (*Vaccinium ovatum*).

AX

MIXED ALPINE SCRUB ALLIANCE

This alliance is a mixture of low shrubs in addition to minor amounts of graminoid and forb species on moist alpine or subalpine sites. These areas are often close to melting snowbeds and may form the ground cover between scattered subalpine conifers such as Red Fir (*Abies magnifica*), Mountain Hemlock (*Tsuga mertensiana*) or Lodgepole Pine (*Pinus contorta* ssp. *murrayana*). Subshrubs such as Partridgefoot (*Luetkea pectinata*), Rock Spiraea (*Holodiscus microphyllus*), White Heather (*Cassiope mertensiana*) and Mountain Heather (*Phyllodoce empetrifomis*) may be found in this alliance, in addition to high-elevation shrub Willows such as Sierra (*Salix eastwoodiae*), Booth's (*S. boothii*), and Lemmon's (*S. lemmonii*). This type has been mapped very sparsely in the Upper Scott Mountains, Upper Salmon Mountains and Eastern Klamath Mountains Subsections of the Mountains Section at elevations above about 6000 feet (1830 m).

BB

BITTERBRUSH ALLIANCE

Bitterbrush (*Purshia tridentata*) is rarely seen as a dominant species in this zone, being much more common in the North Interior Calveg zone. However, it has been identified occasionally in the Upper Scott Mountains and Eastern Klamath Mountains Subsections of the Mountains Section at elevations below about 4400 feet (1342 m). The associated tree species in this Section often include Ponderosa Pine (*Pinus ponderosa*) and Western Juniper (*Juniperus occidentalis* var. *occidentalis*).

BM

CURLLEAF MOUNTAIN MAHOGANY ALLIANCE

Curlleaf Mountain Mahogany (*Cercocarpus ledifolius*) is often a dominant tall shrub on rocky outcrops throughout the drier interior regions of northern California. It is commonly found in the Scott River watershed (Upper Scott Mountains and Duzel Rock Subsections) in the eastern Mountains Section and in three other subsections of this zone but occurs more abundantly in areas further eastward within the Northern Interior Calveg zone. These shrubs are often seen as minor associates in Eastside Pine (*Pinus jeffreyi* and/or *P. ponderosa*) and Western Juniper (*Juniperus occidentalis* var. *occidentalis*) woodlands. Due to intraspecific competition and locations in less fire-prone areas, Curlleaf Mountain Mahogany-dominated sites may consist of a few very large, old individuals. Shrubs such as Bitterbrush (*Purshia tridentata*), Big Sagebrush (*Artemisia tridentata*), Snowbrush (*Ceanothus velutinus*), Rabbitbrush (*Chrysothamnus* spp.), Creeping Snowberry (*Symphoricarpos mollis*), and Mahala Mat (*Ceanothus prostratus*) are often found as associates.

BR

RABBITBRUSH ALLIANCE

This Alliance is identified by the dominance of any species of Rabbitbrush (*Chrysothamnus* spp.) alone or in mixed combinations. Rubber Rabbitbrush (*C. nauseosus*) has been mapped sparsely in pure stands in Scott Bar Mountain, Duzel Rock, Scott Valley and Upper Scott Mountains Subsections of the Mountains Section. Mapped elevations range from approximately 2000 – 4000 feet (610 – 1220 m). Associated tree and shrub species of this general area may include Western Juniper (*Juniperus occidentalis* var. *occidentalis*), Buckwheat (*Eriogonum* spp.), and Wedgeleaf Ceanothus (*C. cuneatus*) and grasses such as Cheatgrass (*Bromus* spp.), Squirreltail (*Elymus elymoides*), and a variety of annual forbs.

BX

GREAT BASIN – MIXED CHAPARRAL TRANSITION ALLIANCE

This alliance is a transitional open type that includes shrub species associated with the Great Basin such as Big Basin Sagebrush (*Artemisia tridentata* ssp. *tridentata*) and Curlleaf Mountain Mahogany (*Cercocarpus ledifolius*) with an equivalent vegetation cover of upper montane hard chaparral species such as Snowbrush (*Ceanothus velutinus*), Deerbrush (*C. integerrimus*) and Mountain Whitethorn Ceanothus (*C. cordulatus*). It has been mapped infrequently at moderate elevations in the Duzel Rock and Lower Scott Mountains Subsections of the Mountains Section at elevations between about 4400 – 5400 feet (1342 – 1646 m). Conifers such as White Fir (*Abies concolor*), Jeffrey Pine (*Pinus jeffreyi*), Douglas-fir (*Pseudotsuga menziesii*) and Ponderosa Pine (*P. ponderosa*) are in the general vicinity of these sites.

C1

ULTRAMAFIC MIXED SHRUB ALLIANCE

Serpentine or ultramafic (i.e., unaltered peridotite, serpentinized peridotite or gabbro) areas of the Mountains, Ranges and southern areas of the Coast Sections may contain a mixture of shrubs and often rare herbaceous plants in low to moderately high montane elevations. These areas vary greatly in degree of barrenness and soil chemistry but typically cannot support open woodlands. The best examples of the Ultramafic Mixed Shrub type are on the less altered Josephine ophiolite (a suite of parent materials, including the above) in the western Mountains Section. Endemic serpentine shrub and herbaceous plant communities also occur on the Trinity ophiolite, an older serpentinized unit at the southern end of this Section, as well as in small units of the Ranges Section. Dubakella, Weitchpec and other soil families underlay these communities. Sites are often adjacent to the more common Ultramafic Mixed Conifer woodland type, in which the associated ultramafic shrubs may form an understory component. Species such as Jepson and Wedgeleaf Ceanothus (*Ceanothus jepsonii*, *C. cuneatus*), Huckleberry Oak (*Quercus vaccinifolia*), California Coffeeberry (*Rhamnus californica*), Creeping Barberry (*Berberis aquifolium* var. *repens*), Dwarf Silktassel (*Garrya buxifolia*), Dwarf Tanoak (*Lithocarpus densiflorus* var. *echinoides*) and Siskiyou Mat (*Ceanothus pumilus*) are likely to be found in the Ultramafic Mixed Shrub type. This type has been mapped at elevations generally between about 1000 – 5200 feet (305 – 1586 m).

CA

CHAMISE ALLIANCE

Chamise (*Adenostoma fasciculatum*) reaches its northeasternmost distribution limits in Tehama County. As a dominant shrub type, Chamise has been mapped abundantly in fifteen subsections of this zone at elevations up to about 4800 feet (1464 m). It may become locally common on low-elevation, xeric sites in southern areas due to its vigorous crown-sprouting abilities after ground disturbances such as intense fires. Chamise is especially likely to dominate south-facing slopes below or adjacent to the Lower Montane Mixed Chaparral type. Chaparral species such as Wedgeleaf Ceanothus (*Ceanothus cuneatus*), Shrub Canyon Live Oak (*Quercus chrysolepis* var. *nana*), and Manzanitas (*Arctostaphylos* spp.) may associate on steeper or more mesic locations. Conifers such as Douglas-fir (*Pseudotsuga menziesii*), Knobcone Pine (*Pinus attenuata*) and Gray Pine (*P. sabiniana*) are often found adjacent to or intermixed with these stands.

CB

SALAL - CALIFORNIA HUCKLEBERRY ALLIANCE

Salal (*Gaultheria shallon*) occurs abundantly in the westernmost edges of the Mountains Section near the coast at elevations below about 2600 feet (800 m). Salal is a conspicuous element in this type, but may not be dominant in the mixture at different locations. A well-developed shrub layer in this type usually occurs on moist, productive soils associated with the coastal conifers Redwood (*Sequoia sempervirens*) and Douglas-fir (*Pseudotsuga menziesii*) when overstory conifers are removed. California Huckleberry (*Vaccinium ovatum*) is the most common shrub associate. In addition, Red Alder (*Alnus rubra*), Dwarf Oregon Grape (*Berberis nervosa*), California Rose-Bay (*Rhododendron macrophyllum*), various ferns, and Blackberry (*Rubus* spp.) are often associated with Salal in the mixture.

CC

CEANOTHUS CHAPARRAL ALLIANCE

The occurrence of very small patches of low- to mid- elevation chaparral stands dominated by various single or mixed species of *Ceanothus* identify this type. Dominant single species have already been described for certain alliances, such as Wedgeleaf Ceanothus (*C. cuneatus*), Blueblossom (*C. thyrsiflorus*), Deerbrush (*C. integerrimus*) and Snowbrush (*C. velutinus*) in this zone. These may occur in mixtures in the Ceanothus Chaparral type, with species such as Jim Brush (*C. oliganthus* var. *sorediatus*), Mountain or Coastal Whitethorn (*C. cordulatus*, *C. incanus*), Lemmon Ceanothus (*C. lemmonii*), and Siskiyou and Mahala Mat (*C. pumilis*, *C. prostratus*) or other *Ceanothus* species possibly present. This type has been mapped very sparsely

in the Gasquet Mountain Ultramafics Subsection of the Mountains Section and the Central Franciscan Subsection of the Ranges Section at elevations below about 4000 feet (1220 m).

CG

GREENLEAF MANZANITA ALLIANCE

Greenleaf Manzanita (*Arctostaphylos patula*) is typically found mixed with other shrubs of the Upper Montane Mixed Chaparral type at moderate to moderately high elevation ranges. It occasionally dominates a site, especially after intense fires in eastern interior regions such as in the Eastern Klamath Mountains Subsection of the Mountains Section, where it has been mapped abundantly. It also has been identified as a dominant type less abundantly in six other subsections of this zone at elevations generally below about 6600 feet (2012 m). Some of these associates include Snowbrush (*Ceanothus velutinus*), Deerbrush (*C. integerrimus*), Mountain Whitethorn (*C. cordulatus*), Bush Chinquapin (*Chrysolepis sempervirens*), Serviceberry (*Amelanchier pallida*), Fremont Silktassel (*Garrya fremontii*) and Hoary Manzanita (*A. canescens*). The Greenleaf Manzanita-dominated type often occupies small openings within White Fir (*Abies concolor*) and mixed conifer forests.

CH

HUCKLEBERRY OAK ALLIANCE

Huckleberry Oak (*Quercus vaccinifolia*) dominates the shrub layer of this type. This relatively low-growing shrub often occurs in montane, open, dry coniferous slopes and ridges in areas of poor soils. The Huckleberry Oak type usually occupies elevations below about 7400 feet (2256 m) as mapped in twenty-five subsections of this zone and is especially common in the Gasquet Mountain Ultramafics, Siskiyou Mountains, Upper Scott Mountains and Trinity Alps Subsections of the Mountains Section. It has less plant diversity than that of the Upper Montane Mixed Shrub type and most often occupies shallow and very coarse soils, especially those derived from ultrabasic and/or granitic rocks. Such conditions restrict the growth of conifers. Minor amounts of Mountain Whitethorn (*Ceanothus cordulatus*), Pinemat Manzanita (*Arctostaphylos nevadensis*) and Greenleaf Manzanita (*A. patula*) often occur here. Such sites are typically surrounded by a variety of upper montane conifers such as Red and White Firs (*Abies magnifica*, *A. concolor*) and Western White Pine (*Pinus monticola*) as well as others in the Ultramafic Mixed Conifer type.

CI

DEERBRUSH ALLIANCE

Deerbrush (*Ceanothus integerrimus*) typically occurs as a successional species after stand-replacing disturbances such as fire, landslide and logging. It has been mapped in dense, scattered patches in the Eastern and Central Franciscan Subsections (Mountains Section) at elevations below about 4400 feet (1342 m). Typical tree associates include Douglas-fir (*Pseudotsuga menziesii*), Ponderosa Pine (*Pinus ponderosa*), Knobcone Pine (*P. attenuata*) and California Black Oak (*Quercus kelloggii*). Shrubs of the Lower Montane Chaparral Alliance such as scrub Oaks (*Quercus* spp.) and Chamise (*Adenostoma fasciculatum*) are also associated with this type in more open stands.

CJ

BREWER OAK ALLIANCE

Dense Brewer Oak (*Quercus garryana* var. *breweri*) thickets occur in scattered areas of the Eastern Franciscan Subsection of the Ranges and in the Scott Bar Mountains and Lower Scott Mountains Subsections of the Mountains Section. This type occurs sparsely on dry sites in other areas as well, having been mapped in nine other subsections across the three sections. It generally develops within an elevation range of about 2000 – 6400 feet (610 – 1952 m). On poorer, drier or lower elevation sites, shrub Brewer Oak stands may grade into the Lower Montane Mixed Chaparral type or on better sites, into tree-sized Oregon White Oak (*Quercus garryana* var. *garryana*) communities. Typical conifer associates include Douglas-fir (*Pseudotsuga menziesii*), Ponderosa Pine (*Pinus ponderosa*) and White Fir (*Abies concolor*).

CK

COYOTE BRUSH ALLIANCE

Coyote Brush (*Baccharis pilularis*) may be the main shrub of certain coastal bluffs, slopes, terraces or sand dunes of northern California, increasing in dominance towards the San Francisco Bay area. It also pioneers recently logged sites in the northwest at some distance from the coast. Coyote Brush sites, such as those in the Marin Hills and Valleys and Point Reyes Subsections of the Coast Section, may develop a diversity and moderately dense cover of other shrubs and ferns such as Poison Oak (*Toxicodendron diversilobum*), Coffeeberry (*Rhamnus californica*), Western Sword Fern (*Polystichum munitum*), Bracken (*Pteridium aquilinum*), California Blackberry (*Rubus ursinus*), Blueblossom (*Ceanothus thyrsiflorus*), as well as perennial herbs and grasses such as Purple Needlegrass (*Nassella pulchra*), Tufted Hairgrass (*Deschampsia caespitosa*), California Oatgrass (*Danthonia californica*), Yellow Bush Lupine (*Lupinus arboreus*) and Dune Lupine (*Lupinus chamissonis*). This

alliance has been mapped widely within thirteen subsections of this zone at low elevations. It is associated with coastal trees such as Douglas-fir (*Pseudotsuga menziesii*) and California Bay (*Umbellularia californica*) as well as an abundance of non-native grasses and forbs.

CL

WEDGELEAF CEANOTHUS ALLIANCE

Wedgeleaf Ceanothus (*Ceanothus cuneatus*) is widely distributed throughout California on low- to mid-elevation chaparral sites and is usually a major component of the Lower Montane Mixed Chaparral type. It becomes locally dominant in widespread areas of the Mountains Section, especially in the (Scott Bar Mountain, Scott Valley and Duzel Rock Subsections and less commonly in eighteen other subsections within the three sections of this zone. These are often disturbed or burned areas and have been mapped at elevations up to about 5600 feet (1708 m). Tree associates include Douglas-fir (*Pseudotsuga menziesii*), Ponderosa Pine (*Pinus ponderosa*), Oregon White Oak (*Quercus garryana*), and in the east, Western Juniper (*Juniperus occidentalis* var. *occidentalis*).

CM

UPPER MONTANE MIXED SHRUB ALLIANCE

The Upper Montane Mixed Shrub type is a high-elevation shrub community that occurs in widely scattered openings within White Fir (*Abies concolor*) and Red Fir (*A. magnifica*) forests. It has been identified mainly in the Mountains Section (North Trinity Mountains and Siskiyou Mountains Subsections) and also occurs more sparsely in two other subsections. Elevations are usually above about 4800 feet (1464 m). In many cases the species are a mixture of Pinemat Manzanita (*Arctostaphylos nevadensis*), Bush Chinquapin (*Chrysolepis sempervirens*), Shrub Tanoak (*Lithocarpus densiflorus* var. *echinoides*) and Huckleberry Oak (*Quercus vaccinifolia*). Bitter Cherry (*Prunus emarginata*) and Rock Spiraea (*Holodiscus microphyllus*) may occasionally be associated. At lower elevations, Greenleaf Manzanita (*A. patula*) and Snowbrush (*Ceanothus velutinus*) may also be present, but these shrubs are more closely identified with the Upper Montane Mixed Chaparral type.

CN

PINEMAT MANZANITA ALLIANCE

This high-elevation shrub community differs from similar types in its species composition and exposure. Pinemat Manzanita (*Arctostaphylos nevadensis*), a low shrub, occurs in a few monospecific patches on harsh, dry, exposed sites or those with rocky or shallow soils that restrict conifer growth. These sites often are present in conifer openings of Red Fir (*Abies magnifica*), White Fir (*A. concolor*) and Subalpine Conifer forests and woodlands. It has been identified more commonly in the Upper Scott Mountains and the Trinity Alps Subsections of the Mountains Section and occasionally within six other subsections of this zone. Elevations are typically within the range 4200 – 8000 feet (1280 – 2440 m).

CP

BUSH CHINQUAPIN ALLIANCE

Pure stands of Bush Chinquapin (*Chrysolepis sempervirens*), similar to those of Mountain Whitethorn (*Ceanothus cordulatus*), are often initiated and maintained after disturbances in montane conifer sites such as through fire, logging or windthrow. This alliance has been mapped occasionally in the Western Jurassic, Siskiyou Mountains and Upper Salmon Mountains Subsections (Mountains Section) and two others in the Ranges Section at mid- to upper-montane elevations up to about 7400 feet (2256 m). Overstory conifers usually associated with these sites include Red and White Fir (*Abies magnifica*, *A. concolor*). Shrubs such as Snowbrush (*C. velutinus*) and Pinemat Manzanita (*Arctostaphylos nevadensis*) may often be found adjacent to or within these stands.

CQ

LOWER MONTANE MIXED CHAPARRAL ALLIANCE

This widespread low-elevation mixed shrub type is usually found below about 5000 feet (1524 m) in this zone, having been mapped in thirty-three subsections. No single shrub species is dominant, as the mixture includes varying mixtures of Chamise (*Adenostoma fasciculatum*), Wedgeleaf Ceanothus (*Ceanothus cuneatus*), Common and Whiteleaf Manzanita (*Arctostaphylos manzanita*, *A. viscida*), shrubby California Buckeye (*Aesculus californica*), Birchleaf Mountain Mahogany (*Cercocarpus betuloides*), Huckleberry Oak (*Quercus vaccinifolia*) and shrub oaks such as Scrub, Canyon Live, and Sadler Oaks (*Quercus berberidifolia*, *Q. chrysolepis* var. *nana*, *Q. sadleriana*). In western areas, it is sometimes found on poorer or ultramafic sites in proximity to Chamise and Knobcone Pine (*Pinus attenuata*) sites. At higher elevations it is often adjacent to the Upper Montane Mixed Chaparral type, with which it may share species such as Greenleaf Manzanita (*A. patula*), Brewer Oak (*Quercus garryana* var. *breweri*) and Deerbrush (*C. integerrimus*). Trees such as Douglas-fir (*Pseudotsuga menziesii*), various

tree Oaks (*Quercus* spp.) and Gray Pine (*Pinus sabiniana*) are also likely to intermix with the other species in this type, but in minor amounts.

CS

SCRUB OAK ALLIANCE

Scattered areas dominated by shrubby oak species (*Quercus* spp.) have been mapped at elevations generally below about 5000 feet (1524 m) where soils are sufficiently deep or shaded in this zone. On serpentine soils, patchy stands of Leather Oak (*Quercus durata*) may develop in chaparral sites of the Eastern and Central Franciscan and Ultrabasic Complex Subsections of the Ranges Section such as in the Frenzel Creek area. Sadler Oak (*Quercus sadleriana*) may become established after fire and logging in montane areas of the Mountains Section such as in the Upper Salmon Mountains, Siskiyou Mountains and Eastern Klamath Mountains Subsections. Other shrubby oaks such as Canyon Live Oak (*Quercus chrysolepis* var. *nana*) and Interior Live Oak (*Quercus wislizenii* var. *frutescens*) may also occur in this type. The Scrub Oak type has also been identified in interior, scattered locations of the Coast Section (Mount St. Helena Flows and Valleys and Coastal and Central Franciscan Subsections). This type has been mapped widely and abundantly across this zone in twenty-one subsections. True Scrub Oak (*Quercus berberidifolia*) is rare in the northern part of this Province, reaching its northern limit in eastern Tehama County. Associated species of the Scrub Oak type may also include minor amounts of Brewer Oak (*Quercus garryana* var. *breweri*), Chamise (*Adenostoma fasciculatum*), Manzanita (*Arctostaphylos* spp.) and other chaparral species.

CV

SNOWBRUSH ALLIANCE

Snowbrush - or Tobacco Brush - (*Ceanothus velutinus* var. *velutinus*) occasionally may invade a montane site after fire, logging or other disturbance and establish its dominance within openings of Subalpine Conifers, White or Red Fir (*Abies concolor*, *A. magnifica*) forests in six subsections of the Mountains and Ranges Sections of this zone. The mapped elevation range of this type is about 4600 – 7400 feet (1402 – 2256 m). Shrub associates that may be adjacent to or within these sites include Greenleaf Manzanita (*Arctostaphylos patula*), Huckleberry Oak (*Quercus vaccinifolia*), Bitter Cherry (*Prunus emarginata*) and Pinemat Manzanita (*A. nevadensis*). Another variety (*C. v.* var. *hookeri*) is found near the coast at elevations below 3000 feet (900 m) in the Coast Section but has not been mapped as a dominant shrub type there. Associated shrubs in that location are California Huckleberry (*Vaccinium ovatum*), Salal (*Gaultheria shallon*) and Blueblossom Ceanothus (*Ceanothus thyrsiflorus*).

CW

WHITELEAF MANZANITA ALLIANCE

Whiteleaf Manzanita (*Arctostaphylos viscida*) occurs occasionally as a dominant shrub in northwestern California up to an elevation of about 6000 feet (1850 m) in previously fire disturbed, ultramafic, dry, low elevation or south-facing foothills sites. The alliance has been mapped abundantly in Shoemaker Bally and Scott Bar Mountain Subsections of the Mountains Section and less commonly in six other subsections of this and the Ranges Sections. This type is normally found adjacent to and below Gray Pine, Ponderosa Pine and Douglas-Fir forest and woodland types. It is present, for example, at elevations usually below 2000 feet (610 m) in the Shasta Lake area. Associated shrubs there include Lemmon Ceanothus (*Ceanothus lemmonii*) and Redbud (*Cercis occidentalis*). In other areas, Greenleaf Manzanita (*Arctostaphylos patula*), Wedgeleaf Ceanothus (*C. cuneatus*), and on serpentine, Leather Oak (*Quercus durata*) may be associated with the Whiteleaf Manzanita type. Trees such as Canyon Live Oak (*Q. chrysolepis*) or Knobcone Pine (*Pinus attenuata*) may also occur sparsely in the overstory of these open sites.

CX

UPPER MONTANE MIXED CHAPARRAL ALLIANCE

A mid-elevation mixed chaparral vegetation type occurs abundantly in this zone, having been mapped in twenty-seven subsections at elevations up to about 8000 feet (2440 m). Such sites are often within openings in mixed conifer, Red and White Fir (*Abies magnifica*, *A. concolor*) and upper montane conifer sites. A mixture of shrub species such as Greenleaf Manzanita (*Arctostaphylos patula*), an indicator species of this type, Hoary Manzanita (*A. canescens*), Mountain Whitethorn (*Ceanothus cordulatus*), Snowbrush (*C. velutinus*), Deerbrush (*C. integerrimus*), Shrub Canyon Live Oak (*Quercus chrysolepis* var. *nana*), Bush Chinquapin (*Chrysolepis sempervirens*), Fremont Silktassel (*Garrya fremontii*), Huckleberry Oak (*Q. vaccinifolia*), Pinemat Manzanita (*A. nevadensis*), certain species of Snowberry (*Symphoricarpos* spp.), Gooseberry (*Ribes* spp.) or Serviceberry (*Amelanchier* spp.) may occur in varying combinations. The type is especially prominent within conifer areas that are steep, south-facing, or are underlain by poorer soils (i.e., shallow, rocky or those derived from serpentinized rock). Stand-replacing fires and other forest disturbances encourage its establishment in addition to that of associated hardwoods such as Canyon Live Oak (*Q. chrysolepis*) and California Black Oak (*Q. kelloggii*). Depending on past and present

environmental and disturbance factors, several species may become locally dominant such as Snowbrush or Greenleaf Manzanita in this area of the state.

CY MOUNTAIN WHITETHORN ALLIANCE

Mountain Whitethorn Ceanothus (*Ceanothus cordulatus*), a widespread shrub in California, may invade forests recently subjected to fire, logging, landslides or other ground disturbances and will occasionally form and dominate a single species dense brushfield. These sites may hinder and delay subsequent conifer regeneration for a few decades. This alliance has been mapped sparsely in the Eastern and Central Franciscan Subsections of the Ranges Section at elevations between about 4600 – 7000 feet (1402 – 2135 m).

NC NORTH COASTAL SCRUB ALLIANCE

Shrubby coastal areas of northern California having no clear single dominant shrub species are identified in the North Coastal Scrub Alliance. It occurs westward of Redwood (*Sequoia sempervirens*) forests in eleven subsections of the Coast Section, being especially prominent in the Crescent City Plain Subsection. Elevations generally range from sea level to 3600 feet (1098 m). Environmental conditions that separate subsets of this type include proximity to the coast and exposure to winds and salt deposition, depth and texture of soils, topography, and the repeated occurrence of fire. For example, Holland (1986) identifies northern maritime chaparral, northern coastal scrub, northern coastal bluff scrub, northern dune scrub and other coastal shrub types in the general area of this section. Barbour and Major (1988) discuss northern coastal scrub types with an abundance of either Coyote Brush (*Baccharis pilularis*) or species of lupine such as Yellow Bush Lupine (*Lupinus arboreus*). Lupine types are best developed on level terraces close to coastal bluffs from Santa Cruz to Sonoma Counties. Other shrubs common in this type include Blueblossom (*Ceanothus thyrsiflorus*), Coastal Whitethorn (*C. incanus*), Hairy Manzanita (*Arctostaphylos columbiana*), Coffeeberry (*Rhamnus californica*), Salal (*Gaultheria shallon*), California Huckleberry (*Vaccinium ovatum*), California Blackberry (*Rubus ursinus*), Poison Oak (*Toxicodendron diversilobum*), Wax Myrtle (*Myrica californica*) and shorter forms of California Bay (*Umbellularia californica*). Grasses and forbs such as European Beachgrass (*Ammophila arenaria*), which is often planted for dune stabilization, Western Sword Fern (*Polystichum munitum*) and wetland trees and shrubs such as Red Alder (*Alnus rubra*) and Willows (*Salix* spp.), may be more common towards the northern end of this section.

NM RIPARIAN MIXED SHRUB ALLIANCE

This type represents a community of shrubs in riparian, seep and moist meadow sites in which no single species achieves dominance in the mapped area. The Riparian Mixed Shrub Alliance usually has a permanent water source at the surface that provides moisture to its obligate hydrophytes such as shrub Willows (*Salix* spp.), Water Birch (*Betula occidentalis*), Mountain Alder (*Alnus incana* ssp. *tenuifolia*), Sitka Alder (*A. viridis* spp. *sinuata*) or other shrubby Alders. Shrubs requiring shade or generally moist conditions such as Blackberry or Gooseberry species (*Rubus* spp., *Ribes* spp.) and Elderberry (*Sambucus* spp.) and/or Interior Rose (*Rosa woodsii*) towards the east may also be included in this mixture. It has been mapped sparsely in four subsections of the Mountains Section at elevations ranging up to about 5600 feet (1646 m).

SC BLUEBLOSSOM ALLIANCE

Blueblossom (*Ceanothus thyrsiflorus*) may be the dominant tall shrub in small open areas of the Coastal and Central Franciscan Subsections of the Coast Section. It also occurs in stands in other near-coastal subsections south to central California. Douglas-fir (*Pseudotsuga menziesii*) and Redwood (*Sequoia sempervirens*) associate with this shrub and form a sparse overstory in disturbed or open forested sites up to an elevation of about 1970 feet (600 m). Toyon (*Heteromeles arbutifolia*), Huckleberry (*Vaccinium* spp.), Coast Whitethorn (*Ceanothus incanus*), Scrub Oak (*Quercus berberidifolia*), Yellow Bush Lupine (*Lupinus arboreus*) and other shrubs may be present in these areas as well. Blueblossom is also a component of the Northern Coastal Scrub type in association with a variety of other shrubs such as Coyote Brush (*Baccharis pilularis*).

SD MANZANITA ALLIANCE

Manzanitas (*Arctostaphylos* spp.) may occupy a shrubland site to the exclusion of other genera on drier or well-drained areas of northern California. Several species intermingle and it is difficult to identify a single dominant in some regions. The Manzanita type has mainly been mapped as scattered patches within six subsections of the three sections in this zone at elevations up to approximately 4800 feet (1464 m). It is prominent in the Eastern Franciscan Subsection of the Coast Ranges

and sparser elsewhere. Any combinations of Manzanita species may be present such as Hoary (*A. canescens*), Hairy (*A. columbiana*), Common (*A. manzanita*), Eastwood (*A. glandulosa*) and Stanford (*A. stanfordiana*). If Whiteleaf Manzanita (*A. viscida*), Pinemat (*A. nevadensis*) or other Calveg Manzanita types have been identified and occur they form a minor component of the type. The Manzanita type is often found adjacent to lower elevation conifers such as Douglas-fir (*Pseudotsuga menziesii*), Gray Pine (*Pinus sabiniana*), Ponderosa Pine (*P. ponderosa*) and Knobcone Pine (*P. attenuata*) and a variety of tree Oaks (*Quercus* spp.). Mesic Lower Montane Mixed Chaparral shrubs such as Scrub Oak (*Quercus berberidifolia*), Poison Oak (*Toxicodendron diversilobum*) and Cherry (*Prunus* spp.) may also occur in minor amounts in this type in addition to shrubs tolerant of serpentine soils such as Jepson Ceanothus (*C. jepsonii*), Wedgeleaf Ceanothus (*C. cuneatus*) and Huckleberry Oak (*Q. vacciniifolia*).

TA

MOUNTAIN (THINLEAF) ALDER ALLIANCE

Mountain or Thinleaf Alder (*Alnus incana* ssp. *tenuifolia*) is a dominant high-elevation shrub or tall tree species, generally occurring in pure stands above 5500 feet (1678 m) in this region. It has been identified occasionally as a type in eleven subsections of the Mountains Section and one in the Ranges Section, generally within an elevation range of about 4000 – 8000 feet (1220 – 2440 m). The type occurs in large perennial grass and forb meadows where stream courses and coarse shallow or gravelly soils exist. These saturated or seasonally flooded sites are often adjacent to or within moister openings of Red and White Fir (*Abies magnifica*, *A. concolor*) and mixed conifer forest sites. Minor inclusions of tree or shrub Willows (*Salix* spp.) or Mountain Maple (*Acer glabrum*) may occur in this type, but the density of these stands limits the growth of other species aside from some aquatic gaminoids and forbs.

WL

WILLOW (SHRUB) ALLIANCE

Shrub forms of Willow (*Salix* spp.) are mapped as this alliance where they dominate the shrub layer in a riparian, seep or meadow site. Since this zone is usually well-watered, the Willow group is widespread and has been mapped broadly in twelve subsections of the Coast, seventeen subsections of the Mountains and three subsections of the Ranges Sections. Elevations are generally below about 6800 feet (2074 m). This diverse group of stands may include any of the following native shrubby species in this area of the state: Gray (*S. bebbiana*), Booth's (*S. boothii*), Del Norte (*S. delnortensis*), Sierra (*S. eastwoodiae*), Narrow-leaved (*S. exigua*), Hooker (*S. hookeriana*), Brewer's (*S. breweri*), Arroyo (*S. lasiolepis*), Lemmon's (*S. lemmonii*), Dusky (*S. melanopsis*), Mackenzie's (*S. prolixa*), Scouler's (*S. scouleriana*), Sandbar (*S. sessilifolia*), Sitka (*S. sitchensis*) and possibly others. Tree and shrub upland associates of these riparian stands include coastal conifers such as Douglas-fir (*Pseudotsuga menziesii*), Grand Fir (*Abies grandis*) and Sitka Spruce (*Picea sitchensis*), hardwoods such as Red Alder (*Alnus rubra*), California Bay (*Umbellularia californica*), tree Willows (other *Salix* spp.), and shrubs such as Coyote Bush (*Baccharis pilularis*), Salal (*Gaultheria shallon*) and California Huckleberry (*Vaccinium ovatum*).

WM

BIRCHLEAF MOUNTAIN MAHOGANY ALLIANCE

Birchleaf Mountain Mahogany (*Cercocarpus betuloides*, also known as *Cercocarpus montanus*), a shrub adapted to a variety of dry sites, is a minor component of the Lower Montane Chaparral community. In this zone, it will occasionally dominate a site and has been mapped occasionally in the Eastern Franciscan and two other subsections of the Ranges Section which are on the lee side of Etsel Ridge and other local ridges in this area. It also has been identified more sparsely in five eastern (more xeric) subsections of the Mountains Section. Elevations are usually below about 6000 feet (1830 m). Trees and shrubs that are associated with these sites are Western Juniper (*Juniperus occidentalis* var. *occidentalis*), Ponderosa Pine (*Pinus ponderosa*), White Fir (*Abies concolor*), Oregon White Oak (*Quercus garryana*) and Wedgeleaf Ceanothus (*C. cuneatus*).

HERBACEOUS

AC

ALPINE GRASSES AND FORBS ALLIANCE

This alpine type consists of perennial herbs and grasses with minor amounts of dwarf shrubs, including cushion-like forms. It forms a low turf on favorable sites but is more often scattered among the rocks and gravel above the tree frostline or on exposed sites below treeline. Alpine plants are often subject to severe winds and very low temperatures in winter due to their presence on windward slopes that are blown almost clear of snow. They also occur on more protected slopes that accumulate deep snowdrifts which may persist until midsummer or later, limiting the growing season. The substrate is usually rocky, with little soil formation and excellent drainage. Alpine plants generally occur above Red Fir (*Abies magnifica*), Whitebark Pine (*Pinus albicaulis*), Foxtail Pine (*P. balfouriana*), Mountain Hemlock (*Tsuga mertensiana*) and other subalpine conifers on the

highest peaks of the Eastern Franciscan Subsection (Ranges Section) and the Mountains Section (Upper Salmon and Upper Scott Mountains Subsections). Elevations are usually above 5600 feet (1708 m). Many of the plants have conspicuous flowers, including such species as Indian Paintbrush (Castilleja arachnoidea), Sierra Primrose (Primula suffrutescens), species of Draba, and Fireweed (Epilobium spp.). Alumroot (Heuchera pringlei), Buttercup (Ranunculus eschscholtzii), Mountain Sorrel (Oxyria digyna), Jeffrey's Shooting Star (Dodecatheon jeffreyi), Gray's Lovage (Ligusticum grayi) and Saxifrage (Saxifraga fragarioides) also occur in this type. Sites on talus or bedrock may include Rushes such as Drummond's (Juncus drummondii) or Parry's (J. parryi), Tolmie's Saxifrage (Saxifraga tolmiei), Creeping Sibbaldia (Sibbaldia procumbens), Pioneer Rockcress (Arabis platysperma), Berry's Penstemon (Penstemon newberryi var. berryi) and Sierra Stonecrop (Sedum obtusatum). The mixture on mafic and ultramafic ridges may include such species as Littleflower Penstemon (P. procerus), Sticky Cinquefoil (Potentilla glandulosa), Curlleaf Daisy (Erigeron compositus) and Pringle's Blugrass (Poa pringlei).

HC

PICKLEWEED - CORDGRASS ALLIANCE

Coastal brackish or salt marshes commonly occur in various subsections of the Coast Section, such as Humboldt Bay Flats and Terraces, Point Reyes, Coastal Hills - Santa Rosa Plain Subsections and others. They are prevalent along Humboldt Bay, estuaries of the Smith, Klamath and Eel Rivers and around San Francisco Bay. Usually dominated by Common Pickleweed (Salicornia virginica) and California Cordgrass (Spartina foliosa), coastal salt marshes also may include invasive non-native species such as Salt Water and Dense-flowered Cordgrasses (Spartina alterniflora, Spartina densiflora) in northern California. Jaumea (Jaumea carnosa) and Saltgrass (Distichlis spicata) are also associated with these wet sites.

HG

ANNUAL GRASSES AND FORBS ALLIANCE

Small areas of dry grasslands are found scattered at moderately low elevations in the western Klamath Mountains, especially on privately owned lands and in the western Trinity Alps area. In the Ranges and Coast Sections, these areas become more extensive on private lands scattered throughout the area and intermix with agriculturally managed sites. Species include introduced and native annual grasses such as Brome (Bromus spp.), Bluegrass (Poa spp.), Wildoats (Avena spp.), Fescue (Vulpia spp.), Dogtail (Cynosurus spp.), Barley (Hordeum murinum), Needlegrass (Nassella spp.), Oatgrass (Danthonia spp.), and a variety of forbs such as Checker Mallow (Sidalcea spp.), Brodiaea (Brodiaea spp.), Wild Hyacinth (Dichelostemma spp.), Yampah (Perideridia spp.) and Mariposa Lily (Calochortus spp.). Oregon White Oak (Quercus garryana) stands are often found adjacent to some upland annual grasslands.

HJ

WET MEADOWS (WET GRASSES AND FORBS) ALLIANCE

Perennially or seasonally wet meadows and grasslands occur on level or gently sloping areas adjacent to perennial streams, seeps, springs and near lakes. They have been identified in the Siskiyou, North Trinity, Snow, and Yolla Bolly Mountains, in Plaskett Meadows and in the Eel River and Letts Creek watersheds, among other areas of this zone within a wide elevation range up to about 7400 feet (2256 m). These are usually small sites that are occupied by obligate hydrophytes such as Sedges (Carex spp.), Rushes (Juncus spp.), Bulrushes (Scirpus spp.) as well as perennial grasses such as Bluegrass (Poa spp.), Brome (Bromus spp.), Fescue (Festuca spp.), Oniongrass (Melica spp.), and Reedgrass (Calamagrostis spp.). These moist sites encourage the development of a rich herbaceous layer that includes such species as Lily (Lilium spp.), False Hellebore (Veratrum spp.), Shooting Star (Dodecatheon spp.), Gentian (Gentiana spp.) and Lousewort (Pedicularis spp.). Meadow edges often abruptly terminate in upper montane coniferous forest species such as Lodgepole Pine (Pinus contorta ssp. murrayana) and Jeffrey Pine (Pinus jeffreyi).

HM

PERENNIAL GRASSES AND FORBS ALLIANCE

This Alliance has been mapped widely across twenty-two subsections in the three sections of this zone and at elevations up to about 7600 feet (2318 m). It is a form of dry to moist grassland in which it is difficult to determine species composition due to its great variability across the state. Disturbance usually is a factor in the maintenance of this type. For example, pasture vegetation mapped as this alliance may be a mix of perennial and annual grasses and forbs and may intergrade with the Annual Grasses and Forbs Alliance. Common plant species in the Perennial Grasses and Forbs Alliance include Needlegrass (Achnatherum spp.), Cheatgrass (Bromus tectorum), Squirreltail (Elymus elymoides) and Wild Rye (Elymus spp.). Wheatgrasses (Agropyron spp.) and Fescues (Festuca spp.) may also be present. Associated forbs of this type also include Rock Cress (Arabis spp.), Monardella (Monardella spp.) the non-native Strawberry Clover (Trifolium fragiferum), Buckwheat (Eriogonum spp.), and occasionally alpine forbs such as Sierra Primrose (Primula suffrutescens).

HT

TULE/CATTAIL ALLIANCE

Interior marsh sites of northern California that have little brackish influence and are not alkaline are usually dominated by Tule (*Scirpus acutus*) or other Bulrushes (*Scirpus* spp.) and Cattails (*Typha latifolia*, *Typha domingensis*, *Typha angustifolia*). These have been identified in small areas within six subsections of the Coast Section at elevations below about 200 feet (61 m). These areas are permanently flooded, usually accumulate deep, peaty soils and may occur near river mouths near the coast and around the margins of lakes and springs further inland. This type may also be adjacent to more saline marshes and may share species of that type, but usually includes more freshwater species such as Umbrella Flatsedge (*Cyperus eragrostis*) and Sedges such as *Carex athrostachya*.

NON-NATIVE VEGETATION

IA

GIANT REED - PAMPAS GRASS ALLIANCE

This non-native alliance is dominated by invasive species of Giant Reed (*Arundo donax*) in wetlands or Pampas Grasses (Black Pampas Grass - *Cortaderia jubata* or White Pampas Grass - *Cortaderia selloana*) on moist, disturbed sites. It has been mapped very sparsely in the Central Franciscan Subsection of the Coast Ranges Section at low elevations.

IB

URBAN-RELATED BARE SOIL

Urban development in California occurs in phases. When land is cleared prior to being paved, this type 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 type often occurs adjacent to managed landscapes in already established urban centers or other paved areas.

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*, *C. atlantica*), Redwood (*Sequoia sempervirens*), Scots 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 AND GRASS ALLIANCE

Riparian and upland areas in California are sometimes invaded by aggressive herbaceous species that are not native to the state or area. Without managed control, these areas are often difficult to use for agricultural or recreational land purposes and may 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*), an alternate host plant for an insect that carries a virus which infects certain crops; Yellow star-thistle (*Centaurea solstitialis*), which is toxic to horses and poses a challenge to eradicate; and many others.

IG

NON-NATIVE / ORNAMENTAL GRASS ALLIANCE

Ornamental or non-native grass species define this alliance. 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. Other non-native conifers, shrubs 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.

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 type. 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. Other non-native conifers, hardwoods and grasses may be present in this type. Mapped areas of this alliance are usually in developed areas, including urban and residential landscapes, parks, recreational areas, highways, cemeteries, etc.

IW

DEVELOPED WATER FEATURES

Facilities for capture and storage of surface or ground waters are sometimes quite visible in developed landscapes and can be recognized easily on aerial photographs. In northern California, many of these areas have been mapped sparsely throughout this zone. Such features in this alliance are golf course ponds, basins for replenishment of aquifers, small lakes in public parks, water and sewage treatment facilities and the like. This type may also identify some water treatment facilities within agricultural and rural areas, where they are often located.

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 only seasonal uses of these lands. Examples include tree nurseries that provide seedlings for forestry plantations, “Christmas tree” plantations for seasonal sales and the like. Native or exotic conifers may also be planted in narrow rows as wind breaks or for ornamental uses within agricultural cropland, such as occasional plantations of Redwoods (*Sequoia sempervirens*).

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 and raspberries.

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.

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 stock 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 seed oils (linseed and cottonseed), fibers and medicinal uses, if any.

A7

AGRICULTURE PONDS / WATER FEATURES

Some artificially constructed water features on otherwise agricultural sites (ranches, farms 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. Land used exclusively for livestock pasture may, however, be mapped as annual grassland in those cases in which land uses are not recognizable.

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 areas, and the like. It does not include areas considered as modified or developed, as in urban areas.

DU

DUNES

The occurrence of coastal dunes in this zone is identified by those sandy accumulating areas in which coastal headlands are usually absent, such as near Ft. Bragg and Pt. Arena. Dunes have been mapped as a barren type of landscape, although finer-scale mapping might identify considerable perennial species such as Morning-Glory (*Calystegia* spp.), Beach-bur (*Ambrosia chamissonis*) or Sand Verbena (*Abronia latifolia*), and perennial grasses such as American Dunegrass (*Leymus mollis*) and Sand-Dune Bluegrass (*Poa douglasii*).

SN

SNOW/ICE

Permanent or long-term snow and ice fields are found on the tallest peaks of this zone. These features may be mapped in areas that are typically barren in drier years but were covered in snow or ice at the time of source imagery acquisition.

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.

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 sizes, 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 within water bodies may be mapped according to their terrestrial dominant vegetation types.

Surface water bodies have recently been mapped separately in some parts of this zone under the following categories:

W1: Rivers and Streams (natural, flowing surface waters)

W2: Perennial Lakes and Ponds

W3: Reservoirs (man-made lakes and ponds)

W4: Bays or Estuaries (near-shore ocean features)

W5: Playas (alkaline or halic desert basin features, formerly flooded)

W6: Intermittent Stream Channel (seasonally flowing channeled waters)

W7: Ocean

W8: Intermittent or Seasonal Lake or Pond (occasionally drained surface waters)

W9: Exposed non-water features (gravel, sand bars, cliff faces, etc.)