

Vegetation Descriptions

NORTH SIERRAN ECOLOGICAL PROVINCE

CALVEG ZONE 3

December 17, 2008

Note: All Subsections mentioned are within the north portion of the Sierra Nevada Section in this Province (Calveg Zone).

CONIFER FOREST / WOODLAND

BT

BIG TREE ALLIANCE

Big Tree or Giant Sequoia (Sequoiadendron giganteum) as a dominant conifer has been mapped in one small relict grove in the Upper Foothills Metamorphic Belt Subsection at about 4000 ft (1220 m). In this area, its closest tree associates are Ponderosa Pine (Pinus ponderosa) and Black Oak (Quercus kelloggii). It is adjacent to the Mixed Conifer - Pine Alliance.

DF

PACIFIC DOUGLAS-FIR ALLIANCE

Pacific Douglas-Fir (Pseudotsuga menziesii) maintains dense stands on north-facing, shaded or moist sites at the same general elevation range as the Douglas-Fir - Pine Alliance, generally below about 6500 ft (1983 m), as mapped in this zone. This Alliance becomes the Douglas-Fir - Pine Alliance when Douglas-Fir mixes with more Ponderosa Pine (Pinus ponderosa) and with the Mixed Conifer-Pine Alliance when additional conifers are present in sufficient quantities. The Douglas-Fir Alliance has been identified as growing in scattered patches in ten subsections, mainly in association with the hardwoods Canyon Live Oak (Quercus chrysolepis), Black Oak (Quercus kelloggii) and less frequently with Tanoak (Lithocarpus densiflorus).

DP

DOUGLAS-FIR - PINE ALLIANCE

Pacific Douglas-Fir (Pseudotsuga menziesii) and Ponderosa Pine (Pinus ponderosa) are often found growing together below about 6400 ft (1952 m) elevation in this zone. The Alliance of these two co-dominants has been mapped abundantly and very widely in five subsections and occasionally in nine more. At elevations as low as 900 ft (275 m) or less, this Alliance is isolated to moist, shady north aspects and to riparian positions. In these riparian areas, these stands may be associated with hardwoods such as Willows (Salix spp.), Bigleaf Maple (Acer macrophyllum) and White Alder (Alnus rhombifolia). On south, east, and west facing aspects at low elevations, tree associates are more likely to be Gray Pine (P. sabiniana), Black Oak (Quercus kelloggii), Tanoak (Lithocarpus densiflorus), Canyon Live Oak (Q. chrysolepis) and Interior Live Oak (Q. wislizenii). On higher-elevation north aspects, a transition from this Alliance to the Mixed Conifer - Pine Alliance is evidenced by additional traces of Sugar Pine (Pinus lambertiana) and White Fir (Abies concolor). The shrub type most commonly associated with it is the Lower Montane Mixed Chaparral Alliance containing mixtures of species such as Wedgeleaf Ceanothus (Ceanothus cuneatus), Whiteleaf Manzanita (Arctostaphylos viscida) and Poison Oak (Toxicodendron diversilobum).

EP

EASTSIDE PINE ALLIANCE

On the eastside of the northern Sierra Nevada, Jeffrey Pine (Pinus jeffreyi) and Ponderosa Pine (P. ponderosa) may occur together or separately in this alliance as dominants or co-dominants and have been

mapped within an elevation range of about 4000 - 8200 feet (1220 - 2500 m). The Eastside Pine type has been mapped abundantly in the Diamond Mountains – Crystal Peak, Fredonyer Butte – Grizzly Peak, Frenchman and Tahoe – Truckee Subsections and less frequently in six other subsections. It is characterized by the presence of Great Basin shrubs, forbs and grasses such as Big Sagebrush (Artemisia tridentata), Bitterbrush (Purshia tridentata), Curlleaf Mountain Mahogany (Cercocarpus ledifolius), Bloomer Goldenbush (Ericameria bloomeri), Mules-ears (Wyethia mollis), Arrowleaf Balsamroot (Balsamorhiza sagittata), Idaho fescue (Festuca idahoensis) and Wildrye grasses (Elymus spp.). When these taxa are not present onsite or in the immediate vicinity, the resulting alliance is defined by the dominant yellow pine, Ponderosa or Jeffrey. Drier or colder site conditions east of the Sierra crest in the habitats of the Eastside Pine Alliance occur as a result of several factors. For example, rainshadow deficits in moisture and colder temperatures from the lack of a maritime layer influence result from the location of higher peaks in the west. Low soil available moisture in the eastside condition occurs from harsher substrates such as the more extensive vulcanism on the eastside (lava flows and pyroclastic deposits). In addition, the abundance of coarse-textured glacial deposits in that region contributes to excessively drained soils. White Fir (Abies concolor) grows more abundantly on north aspects and in drainages, replacing this Alliance with the Mixed Conifer - Fir Alliance on those sites if the appropriate conifer mixtures occur. After fire or other major disturbances, Lodgepole Pine (Pinus contorta ssp. murrayana) may become locally abundant towards the upper limits of the Eastside Pine type. Washoe Pine (Pinus washoensis) can occasionally be found above about 6400 ft (1952 m) elevation, such as in the Bald Mountain Range (Tahoe - Truckee Subsection) and may be present in minor amounts on some sites. Mountain (Sierra or Western) Juniper (Juniperus occidentalis var. australis; also known as Juniperus grandis) may also be found in trace amounts in this Alliance. Hardwoods such as Willows (Salix spp.) and Black Oak (Quercus kelloggii) are limited but occasionally occur as understory species.

JP

JEFFREY PINE ALLIANCE

Jeffrey Pine (Pinus jeffreyi) in westside northern Sierra Nevada sites may replace Ponderosa Pine (P. ponderosa) on specific substrates, such as peridotite areas of the Upper Foothills Metamorphic Belt, Bucks Lake, Greenville - Graeagle, and Granitic and Metamorphic Foothills Subsections, particularly around the Red Hill area. Shrub species such as Wedgeleaf Ceanothus (Ceanothus cuneatus), Whiteleaf Manzanita (Arctostaphylos viscida), Hoary Coffeeferry (Rhamnus tomentella ssp. tomentella), and Shrub Canyon Live Oak (Quercus chrysolepis var. nana) are commonly present under these conditions. Stands of the Jeffrey Pine Alliance typically occur at mid-montane elevations in the westside of this zone, sometimes below 4000 ft (1220 m).

The Jeffrey Pine Alliance may also be found growing on granitic outcrops or on glaciated soils such as tills and outwash deposits that create xeric microenvironments at elevations up to about 8400 ft (2562 m) in eastside northern Sierra Nevada habitats. It is prominent in the Tahoe Valley, Tahoe-Truckee and Carson Range Subsections on this side of the range. The type has been mapped in a total of fifteen subsections of this zone. Shrubs common in the vicinity of these eastside areas include Greenleaf Manzanita (A. patula), Huckleberry Oak (Q. vaccinifolia) and Pinemat Manzanita (A. nevadensis). The Jeffrey Pine Alliance occurs adjacent to and merges with the Eastside Pine Alliances as Great Basin species become more prominent in the understory, including Big or Mountain Sagebrush (Artemisia tridentata), Curlleaf Mountain Mahogany (Cercocarpus ledifolius) and Bitterbrush (Purshia tridentata). Aspen (Populus tremuloides) and Black Oak (Q. kelloggii) also occasionally occur as understory hardwoods on these sites.

KP

KNOBCONE PINE ALLIANCE

Knobcone Pine (Pinus attenuata), a small to medium-sized conifer tolerant of ultrabasic and diverse other parent materials, occurs in small dense stands on the westside scattered throughout the Upper Foothills Metamorphic Belt at elevations between about 1600 – 4600 ft (488 – 1402 m). This Alliance is often a result of past disturbances (usually fire) and is typically associated with lower elevation trees such as Douglas-Fir (Pseudotsuga menziesii), Ponderosa Pine (Pinus ponderosa) and Black and Canyon Live Oaks (Quercus kelloggii, Q. chrysolepis).

LP

LOGEPOLE PINE ALLIANCE

The Lodgepole Pine Alliance, a medium-sized conifer of open habitats, has been mapped at elevations up to about 10,000 ft (3050 m) in this zone. Lodgepole Pine (*Pinus contorta* ssp. *murrayana*) is found either in dense, pure stands in swales with abundant year-round moisture or as scattered individual trees on very dry soils. The Lodgepole Pine Alliance has been identified abundantly in the Glaciated Batholith and Volcanic Flows, Tahoe Valley and Carson Range Subsections and less frequently in ten others. This conifer is an aggressive pioneer series on such sites, but as microsite conditions improve, it may be replaced by Red Fir (*Abies magnifica*), White Fir (*Abies concolor*), or Jeffrey Pine (*Pinus jeffreyi*). On the periphery of meadows, as the water table level drops, Lodgepole Pine may be invasive and replace the sedge and forb species. Shrubs such as Huckleberry Oak (*Quercus vaccinifolia*) and Mountain Sagebrush (*Artemisia tridentata* ssp. *vaseyana*) are often present on or in the vicinity of these sites.

MB

MIXED CONIFER WITH GIANT SEQUOIA ALLIANCE

This Alliance is limited to relic stands on the Tahoe National Forest in which Giant Sequoia (*Sequoiadendron giganteum*) occurs towards the eastern edge of the Upper Foothills Metamorphic Belt at elevations from about 4000 – 5200 ft (1220 – 1586 m). The Mixed Conifer - Pine overstory is dominated by Sugar Pine (*Pinus lambertiana*), Incense Cedar (*Calocedrus decurrens*), Pacific Douglas-Fir (*Pseudotsuga menziesii*), Ponderosa Pine (*Pinus ponderosa*), and occasionally White Fir (*Abies concolor*). Other understory species include Dogwood (*Cornus* spp.) and Western Azalea (*Rhododendron occidentale*). As Giant Sequoia is not a drought tolerant species, the maintenance of this and other more southerly groves is dependent on mesic soils with sufficient soil moisture during the dry summer period. In addition, the stability of these groves is maintained by frequent fires which reduce competition by conifers, reduce forest floor litter buildup and allow germination of the Sequoia seeds.

MD

INCENSE CEDAR ALLIANCE

Incense Cedar (*Calocedrus decurrens*) is often identified as one of the conifers in the Mixed Conifer - Pine Alliance mixture. It has been mapped very infrequently as a dominant type within its own Alliance on drier, more open slopes. In this zone, it is found in small areas of the Upper Foothills Metamorphic Belt at elevations from about 2100 - 2296 ft (640 - 700 m). Canyon Live Oak (*Quercus chrysolepis*) is associated with these stands.

MF

MIXED CONIFER - FIR ALLIANCE

The Mixed Conifer - Fir Alliance is the high elevation and often more moisture-deficient counterpart of the Mixed Conifer - Pine Alliance. It occurs at elevations up to about 9000 ft (2745 m) in this zone, typically on eastside soils. An extensive type, it has been mapped widely and very abundantly in eleven subsections and less frequently in seven others. Three major species define this mixed conifer type: White Fir (*Abies concolor*), Jeffrey Pine (*Pinus jeffreyi*), and/or Lodgepole Pine (*P. contorta* ssp. *murrayana*). At lower elevations the Mixed Conifer Pine Alliance associates such as Pacific Douglas-Fir (*Pseudotsuga menziesii*) and Ponderosa Pine (*P. ponderosa*) may occur in trace amounts in the Mixed Conifer - Fir type. As elevations begin to increase, Red Fir (*A. magnifica*) becomes more prominent. Other associates at all elevations may include Sugar Pine (*P. lambertiana*) and Incense Cedar (*Calocedrus decurrens*). Upper elevation and Great Basin shrubs are often found on or next to these locations, including Greenleaf Manzanita (*Arctostaphylos patula*), Huckleberry Oak (*Quercus vaccinifolia*), Curlleaf Mountain Mahogany (*Cercocarpus ledifolius*), Snowbrush (*Ceanothus velutinus*), Mountain Alder (*Alnus incana* ssp. *tenuifolia*), Mountain Sagebrush (*Artemisia tridentata* ssp. *vaseyana*), and Bitterbrush (*Purshia tridentata*). Black Oak (*Q. kelloggii*), Willows (*Salix* spp.) and Quaking Aspen (*Populus tremuloides*) are also likely to occur on these sites.

MH

MOUNTAIN HEMLOCK ALLIANCE

Mountain Hemlock (*Tsuga mertensiana*), the dominant conifer of this Alliance, is representative of some subalpine areas within the Sierra Nevada. It has been mapped only within the Glaciated Batholith and Volcanic Flows, Upper Batholith and Volcanic Flows and Carson Ranges Subsections and is generally found on north or east facing slopes where snow accumulation holds well into the summer months. It occurs as a dominant species in cold swales from 7000 - 9000 ft (2130 - 2740 m), often associated with Red Fir (*Abies magnifica*), and in almost pure open stands on ridge tops above 8500 ft (2590 m) with Western White Pine (*Pinus monticola*). In moist areas Willows (*Salix spp.*) and Mountain Alder (*Alnus incana* ssp. *tenuifolia*) are associated understory taxa.

MN

MCNAB CYPRESS ALLIANCE

McNab Cypress (*Cupressus* or *Callitropis macnabiana*) has a shrub-like form, and is found as scattered clumps of trees, often on very dry harsh soils, generally indicating environmental conditions unfavorable to the establishment and growth requirements of other conifer and hardwood species. When it dominates the conifer canopy as an alliance, it occurs intermingled with the Ponderosa Pine and Gray Pine Alliances, at elevations from about 2000 - 2260 ft (610 - 689 m) on peridotite parent material. These sites are on the westside of the Sierra Nevada Section in the Granitic and Metamorphic Foothills and Upper Foothills Metamorphic Belt Subsections. The McNab Cypress Alliance is often associated with species of *Ceanothus*, Hoary Coffeeberry (*Rhamnus tomentella* ssp. *tomentella*), and other shrub species more typical of the Lower Montane Mixed Chaparral Alliance.

MP

MIXED CONIFER - PINE ALLIANCE

This Alliance occupies the western and eastern slopes of the Northern Sierras of this zone at elevations between about 1900 - 7800 ft (580 - 2380 m) on mesic soils, where it is principally found. The Mixed Conifer – Pine Alliance has been mapped abundantly in six subsections and less frequently in eleven others. It is defined by the presence of conifer species such as Ponderosa Pine (*Pinus ponderosa*), Incense Cedar (*Calocedrus decurrens*), Douglas-Fir (*Pseudotsuga menziesii*), White Fir (*Abies concolor*), and Sugar Pine (*Pinus lambertiana*) and the absence or only trace amounts of Jeffrey Pine (*Pinus jeffreyi*). Any one of these species may become locally dominant over small areas but dominance is shared by more than two species in this type. Knobcone Pine (*Pinus attenuata*) may occur as a pioneer species on shallow soils, south facing slopes or lava flow areas as an additional associate in this Alliance.

The pines normally are prominent on south and west facing slopes, Pacific Douglas-Fir and White Fir on north and east slopes, and Incense Cedar as a secondary component of all slopes. At lower elevations this Alliance may be found on north aspects and others such as the Gray Pine, Ponderosa Pine, Douglas-Fir - Pine, Black Oak, Tanoak, and Canyon Live Oak Alliances are more likely to be present on south, east and west facing aspects. At higher elevations this Alliance may typically occur on south, east and west aspects and the White Fir or Mixed Conifer - Fir Alliances on north aspects. Riparian habitats may be occupied by this Alliance in association with such Alliances as White Alder, Maple, and Willow. At lower elevations, Gray Pine (*Pinus sabiniana*), Tanoak (*Lithocarpus densiflorus* and Black Oak (*Quercus kelloggii*) may become common associates. Understory shrubs within this Alliance include Deerbrush (*Ceanothus integerrimus*) and Whiteleaf Manzanita (*Arctostaphylos viscida*) on lower sites and Greenleaf Manzanita (*Arctostaphylos patula*) at higher elevations.

PD

GRAY PINE ALLIANCE

This Alliance, dominated by Gray Pine (*Pinus sabiniana*), grows primarily in the foothills of the Sierra Nevada on steep, dry or rocky slopes with south aspects, below about 4200 ft (1280 m). In the northern Sierras, it is found occasionally in the Upper Foothills Metamorphic Belt and Granitic and Metamorphic Foothills Subsections. These sites are typically diverse in structure, with a mixture of hardwoods such as

Black, Blue, and Canyon and Interior Live Oaks (Quercus kelloggii, Q. douglasii, Q. chrysolepis, Q. wislizenii), and low-elevation chaparral shrubs such as Wedgeleaf Ceanothus (Ceanothus cuneatus) and Whiteleaf and Common Manzanitas (Arctostaphylos viscida, A. manzanita). In addition to occasional sparse conifers on these sites such as Ponderosa Pine (Pinus ponderosa) and Douglas-Fir (Pseudotsuga menziesii), patches of annual grasses are often found within or adjacent to Gray Pine stands.

PE

SUGAR PINE ALLIANCE

Sugar Pine (Pinus lambertiana), considered to be the largest and tallest pine in the world, is one of the conifers associated with the Mixed Conifer – Pine Alliance across California. In this zone, it occurs very sparsely as a dominant conifer, having been mapped only in the Upper Foothills Metamorphic Belt Subsection at elevations between about 4200 – 4800 ft (1280 – 1464 m). Its tree associates there include Canyon Live Oak (Quercus chrysolepis) and Ponderosa Pine (P. ponderosa).

PJ

SINGLELEAF PINYON ALLIANCE

Singleleaf Pinyon Pine (Pinus monophylla) is uncommon in this area, but has been mapped sparsely as a dominant conifer in portions of the Eastern Slopes and Carson Range Subsections in the elevation range of about 5200 - 6600 ft (1586 – 2012 m). Great Basin and Upper Montane Chaparral shrubs such as Big Basin or Mountain Sagebrush (Artemisia tridentata), Curlleaf Mountain Mahogany (Cercocarpus ledifolius) and Greenleaf Manzanita (Arctostaphylos patula) may be present on these sites.

PP

PONDEROSA PINE ALLIANCE

This Alliance is defined by pure stands of Ponderosa Pine (Pinus ponderosa). It is very commonly found in this zone at elevations between about 900 - 6400 ft (275 - 1952 m) on mesic westside slopes in the northern Sierra Nevada and less commonly on the eastside. This widespread type has been mapped abundantly in five subsections and less frequently in eight others. Pure stands of Ponderosa Pine often exist where the conifer is planted for revegetation of areas consumed by fire and in logged areas.

At lower elevations, this Alliance mixes with or is found adjacent to other common foothill conifers such as Douglas-Fir (Pseudotsuga menziesii), and Gray Pine (P. sabiniana). On south, east and west aspects, it is likely to be associated with hardwoods such as Blue and Canyon and Interior Live Oaks (Quercus douglasii, Q. chrysolepis, Q. wislizenii), on open flats and riparian areas with Valley Oaks (Q. lobata) on north aspects with Black Oaks (Q. kelloggii) and in the Granitic and Metamorphic Foothills Subsection, with Tanoak (Lithocarpus densiflorus) as well. As elevation and site productivity increases, White Fir (Abies concolor) and other conifers may become established on similar sites and become identified as the Mixed Conifer – Pine Alliance. Shrubs of lower montane areas such as Whiteleaf Manzanita (Arctostaphylos viscida), Wedgeleaf Ceanothus (Ceanothus cuneatus), and Scrub Oaks (Quercus spp.) are commonly found on sites within the Ponderosa Pine Alliance.

PW

PONDEROSA PINE – WHITE FIR ALLIANCE

Ponderosa Pine (Pinus ponderosa) and White Fir (Abies concolor) occur together in this Alliance with no other significant conifers present in the mixture. Conditions appear to be optimal for White Fir regeneration and maintenance, often in the subcanopy and for the persistence of Ponderosa Pine, usually in the overstory. This type has been mapped sparsely along eastern areas of the Upper Foothills Metamorphic Belt, western areas of the Upper Batholith and Volcanic Flows and in the Batholith and Volcanic Flows Subsections at elevations between about 4800 – 6000 ft (1464 – 1830 m). In addition to the alliances dominated by the indicator conifers, this type also grades into the Mixed Conifer – Fir type with the addition of Jeffrey Pine (P. jeffreyi) towards the eastern sections of this zone. Black Oak (Quercus kelloggii) may occur in some of these stands as well as shrubs of the Upper Montane Mixed Chaparral type such as Greenleaf Manzanita (Arctostaphylos patula).

RF

RED FIR ALLIANCE

Red Fir (*Abies magnifica*), a conifer of cool and moist habitats, is not distinguished by either of its two varieties in this alliance (var. *magnifica*, var. *shastensis*). As a dominant conifer in this alliance, it generally occurs in dense, pure stands or as an inclusion in the Mixed Conifer - Fir Alliance. This type has been mapped widely on both east and west slopes at elevations between 4000 – 9600 ft (1220 – 2928 m) on frigid soils, being especially prominent within the Upper Batholith and Volcanic Flows, Glaciated Batholith and Volcanic Flows and Carson Range Subsections. It also has been identified occasionally within thirteen other subsections of this zone. Understory plants do not occur in dense Red Fir stands with heavy litter accumulation except for Pipsissewa (*Chimaphila menziesii*) and White-veined Wintergreen (*Pyrola picta*). In more open stands or where Red Fir intergrades with the Mixed Conifer - Fir Alliance, Snowbrush (*Ceanothus velutinus*), Mountain Whitethorn (*Ceanothus cordulatus*), Pinemat Manzanita (*Arctostaphylos nevadensis*), and Greenleaf Manzanita (*A. patula*) are the most common understory shrubs. White Fir (*A. concolor*), Western White Pine (*Pinus monticola*) and Lodgepole Pine (*P. contorta* ssp. *murrayana*) are associated conifer species. Mountain Hemlock (*Tsuga mertensiana*) may occur as isolated trees in colder areas of the Red Fir Alliance.

SA

SUBALPINE CONIFERS ALLIANCE

The Subalpine Conifers Alliance is defined as a mixture of high elevation conifer species where no one conifer species is dominant. This Alliance occurs above about 6000 ft (1830 m) on steep north and east aspects as scattered occurrences within five subsections of this zone. It contains mixtures of conifers such as Mountain Hemlock (*Tsuga mertensiana*), Western White Pine (*Pinus monticola*), Whitebark Pine (*P. albicaulis*), Lodgepole Pine (*P. contorta* ssp. *murrayana*), and minor amounts of Red Fir (*Abies magnifica*). The shrub understory and ground cover are better developed where this type adjoins moist areas, such as along riparian zones and montane meadows, but on the eastside, shrub associates may include Mountain Sagebrush (*Artemisia tridentata* ssp. *vaseyana*) and Low Sagebrush (*A. arbuscula*).

WB

WHITEBARK PINE ALLIANCE

Whitebark Pine (*Pinus albicaulis*), a treeline conifer, may occur in pure and usually open stands as defined in this alliance, or with Red Fir (*Abies magnifica*), Western White Pine (*P. monticola*), and Lodgepole Pine (*P. contorta* ssp. *murrayana*) on ridge tops on high elevation cryic soils. This Alliance grades into the mixed Subalpine Conifers Alliance and often assumes krummholtz forms on very exposed sites. It has been mapped occasionally in the Glaciated Batholith and Volcanic Flows, Tahoe-Truckee, Eastern Slopes and Carson Range Subsections in an elevation range from about 8400 – 10,600 ft (2562 – 3233 m).

WF

WHITE FIR ALLIANCE

Pure stands of White Fir (*Abies concolor*) are found primarily on both eastside and westside slopes of the northern Sierras at an elevation range of about 3000 – 9200 ft (915 – 2806 m). In general, White Fir occurs typically in cool, moist, shady environments on north aspects, in riparian positions and around large lakes, such as Bucks Lake. This Alliance, defined by this dominant conifer, has been mapped widely with varying intensities within fourteen subsections in this zone. The White Fir band often represents an intermediate zone between the Mixed Conifer - Pine and Mixed Conifer - Fir Alliances on south and west aspects, and between the Mixed Conifer - Pine and Red Fir Alliances on north and east aspects, the conifer usually being a component of these three types. Black Oak (*Quercus kelloggii*) is most commonly associated as the understory hardwood in mixed stands in addition to shrubs of the Upper Montane Chaparral Alliance such as Snowbrush (*Ceanothus velutinus*) and Greenleaf Manzanita (*Arctostaphylos patula*) in open White Fir stands.

WJ

WESTERN (MOUNTAIN) JUNIPER ALLIANCE

Western, Mountain or Sierra Juniper (*Juniperus occidentalis* var. *australis*, recently renamed *Juniperus grandis*), a relatively long-lived, short-boled conifer of harsh open sites, is shade-intolerant and develops wind-trained forms at upper montane eastside slopes of the northern Sierras. As a dominant conifer in this alliance, it has been mapped in widely scattered sites in six subsections in the general elevation range of about 5000 – 8800 ft (1524 – 2684 m). Mountain or Western Juniper usually occurs adjacent to pines in the Eastside Pine Alliance and commonly associates with Big Basin or Mountain Sagebrush (*Artemisia tridentata*).

WP

WASHOE PINE ALLIANCE

Washoe Pine (*Pinus washoensis*) becomes dominant in a few areas of northeastern California. This alliance has been mapped very sparsely in this region in the Tahoe - Truckee Subsection at an elevation range of 8068 - 8192 ft (2460 - 2560 m). At this altitude and east of the Sierra crest, this pine associates with Western White Pine (*P. monticola*), conifers in the Mixed Conifer - Fir Alliance such as Jeffrey Pine (*P. jeffreyi*) and White Fir (*Abies concolor*), and eastside shrubs such as Bitterbrush (*Purshia tridentata*) and Curlleaf Mountain Mahogany (*Cercocarpus ledifolius*).

WW

WESTERN WHITE PINE ALLIANCE

Western White Pine (*Pinus monticola*) occurs as a dominant conifer in small groves on high elevation, dry, windblown, eastside and often granitic slopes in the northern Sierras. On better sites, it associates with Red Fir (*Abies magnifica*), Mountain Hemlock (*Tsuga mertensiana*), Whitebark Pine (*P. albicaulis*) and Lodgepole Pine (*P. contorta* ssp. *murrayana*) in the Subalpine Conifers Alliance. The Western White Pine Alliance has been mapped in scattered areas of five subsections of this zone within an elevation band of about 7000 - 10,200 ft (2135 - 3111 m). Moderately high elevation shrubs such as Huckleberry Oak (*Quercus vaccinifolia*) and Snowbrush (*Ceanothus velutinus*), and eastside shrubs such as Mountain Big Sagebrush (*Artemisia tridentata* ssp. *vaseyana*) and Low Sagebrush (*A. arbuscula*) in addition to high-elevation alpine grasses and herbaceous species are associated with this type.

HARDWOOD FOREST / WOODLAND

FM

CURLLEAF MOUNTAIN MAHOGANY ALLIANCE

Although the shrub form is more commonly identified, the single-stemmed tree form of Curlleaf Mountain Mahogany (*Cercocarpus ledifolius* var. *intermontanus*) has been mapped occasionally as a dominant hardwood in the northern and eastern sections of the Tahoe - Truckee and Carson Range Subsections. Elevations are in the range of 5000 - 8800 ft (1525 - 2684 m). Conifers such as Jeffrey Pine (*Pinus jeffreyi*) and White Fir (*Abies concolor*) and other Great Basin shrubs such as Big or Mountain and Low Sagebrush (*Artemisia tridentata*, *A. arbuscula*) are typical associates of this type.

NR

RIPARIAN MIXED HARDWOOD ALLIANCE

Along rivers and non-ephemeral streams, a mixture of riparian hardwood species may occur where no clearly dominant species exists. In this Calveg zone, the Riparian Mixed Hardwood Alliance is used to describe areas mapped sparsely in six subsections at elevations below about 7000 ft (2135 m). This mixture includes combinations of Quaking Aspen (*Populus tremuloides*), Willow (*Salix* spp.), White Alder (*Alnus rhombifolia*) and Black Cottonwood (*Populus balsamifera* spp. *trichocarpa*). It is associated with upland conifers such as Douglas-Fir (*Pseudotsuga menziesii*) and Ponderosa Pine (*Pinus ponderosa*).

NX

INTERIOR MIXED HARDWOOD ALLIANCE

Several species of upland hardwoods occur together in stands with no clearly dominant species in this zone. The Interior Mixed Hardwoods Alliance has been identified at elevations below about 4000 ft (1220 m) in scattered areas, mainly along the western edge of the Upper Foothills Metamorphic Belt and extreme southern edge of the Granitic and Metamorphic Foothills Subsections and in two other subsections. The mixture includes any combinations of non-dominant Interior Live Oak (*Quercus wislizenii*), Canyon Live Oak (*Q. chrysolepis*), Valley Oak (*Q. lobata*), or Blue Oak (*Q. douglasii*). Shrubs commonly found in the Lower Montane Mixed Chaparral Alliance such as Wedgeleaf Ceanothus (*Ceanothus cuneatus*), Poison Oak (*Toxicodendron diversilobum*) and Whiteleaf Manzanita (*Arctostaphylos viscida*) may also occur on these sites. Trees in the Montane Mixed Hardwood Alliance such as Black Oak (*Q. kelloggii*) may be present, but do not form the majority elements in the mixture. Overstory conifers mainly include Douglas-Fir (*Pseudotsuga menziesii*), Ponderosa Pine (*Pinus ponderosa*), and Gray Pine (*P. sabiniana*).

QB

CALIFORNIA BAY ALLIANCE

The California Bay Alliance is a minor component of the hardwood cover in the northern Sierras. It is dominated by California Bay (*Umbellularia californica*), having been mapped between about 1800 – 3800 ft (548 – 1158 m) elevation and is found to a very limited extent in the Upper Foothills Metamorphic Belt Subsection. California Bay is often an understory species growing within Douglas-Fir (*Pseudotsuga menziesii*) and Ponderosa Pine (*Pinus ponderosa*) forests in association with hardwoods such as Canyon Live Oak (*Quercus chrysolepis*).

QC

CANYON LIVE OAK ALLIANCE

Canyon Live Oak (*Quercus chrysolepis*) is a well-distributed hardwood that occurs in pure or mixed stands in proximity to various conifers and hardwoods such as Ponderosa, Gray and Jeffrey Pines (*Pinus ponderosa*, *P. sabiniana*, *P. jeffreyi*), Douglas-Fir (*Pseudotsuga menziesii*), Black and Interior Live Oaks (*Q. douglasii*, *Q. wislizenii*) and others in this zone. As a dominant hardwood in this alliance, it is generally found on more xeric habitats or in steep canyons at elevations up to about 6200 ft (1890 m). The Canyon Live Oak Alliance is relatively abundant in the Granitic and Metamorphic Foothills and Upper Foothill Metamorphic Belt Subsections and to a more limited extent elsewhere within eight other subsections. At low elevations it may occur on north aspects in contrast to dominant stands of Interior Live Oak, Ponderosa Pine, or Gray Pine, which are more likely to be found on other aspects. Knobcone Pine (*Pinus attenuata*) may associate with it occasionally in mixed conifer-hardwood stands. A mixture of shrubs such as Wedgeleaf Ceanothus (*Ceanothus cuneatus*), Chamise (*Adenostoma fasciculatum*), and Whiteleaf Manzanita (*Arctostaphylos viscida*) often occur in the understory of this alliance.

QD

BLUE OAK ALLIANCE

Blue Oak (*Quercus douglasii*) occurs at the eastern edge of its range in pure or mixed stands in the northern Sierras. It is often found adjacent to the Gray Pine, Ponderosa Pine, and Douglas-Fir - Pine Alliances on gentle slopes below about 3300 ft (1006 m). The Blue Oak Alliance has been identified to a limited extent in the Upper Foothills Metamorphic Belt and the Granitic and Metamorphic Foothills Subsections. On steeper south aspects, Interior Live Oak (*Quercus wislizenii*) may become more abundant. In deeper soils or on more shaded sites, Blue Oak may be replaced with Black Oak (*Quercus kelloggii*). Wedgeleaf Ceanothus (*Ceanothus cuneatus*), Whiteleaf Manzanita (*Arctostaphylos viscida*), and Poison Oak (*Toxicodendron diversilobum*) are scattered throughout this Alliance.

QE

WHITE ALDER ALLIANCE

White Alder (*Alnus rhombifolia*) occurs in pure or mixed stands along rivers and streams throughout much of the state. In this zone, it has been mapped as a dominant type sparsely in the Diamond Mountains - Crystal Peak, Granitic and Metamorphic Foothills, Greenville-Graeagle, Bucks Lake, and Upper Foothills Metamorphic Belt Subsections. It is sometimes found in proximity to upland conifers such as Douglas-Fir (*Pseudotsuga menziesii*), Ponderosa Pine (*Pinus ponderosa*) and White Fir (*Abies concolor*). This Alliance is generally found below about 5400 ft (1646 m) in association with a variety of riparian or shade tolerant species such as Pacific Yew (*Taxus brevifolia*), California Hazelnut (*Corylus cornuta* var. *californica*), Fremont Cottonwood (*Populus fremontii*), Elk Clover (*Aralia californica*), Columbine (*Aquilegia formosa*), and Monkeyflower (*Mimulus cardinalis*).

QF

FREMONT COTTONWOOD ALLIANCE

Fremont Cottonwood (*Populus fremontii*) as a dominant hardwood is found to a very limited extent in the Carson Range Subsection. It grows adjacent to surface water sources in association with other obligate riparian species but in this area is also found in the proximity of Great Basin upland shrubs such as Big Basin Sagebrush (*Artemisia tridentata* spp. *tridentata*) and Bitterbrush (*Purshia tridentata*). Elevations of these sites are in the range of about 4800-6000 ft (1464 – 1830 m). This obligate seeder produces an abundance of tiny seeds that require moist substrate to germinate. Since Fremont Cottonwood roots must grow rapidly to avoid desiccation during the Mediterranean-type summer months, a constant supply of water is necessary and Fremont Cottonwood is highly susceptible to water flow manipulation.

QH

MADRONE ALLIANCE

Pacific Madrone (*Arbutus menziesii*), at the northeastern limit of its range in California, occasionally occurs in pure stands in this zone. It has been mapped sparsely within the Granitic and Metamorphic Foothills and Upper Foothills Metamorphic Belt Subsections of the Sierra Nevada at elevations less than about 4000 ft (1220 m). These stands usually occur adjacent to lower montane trees such as Douglas-Fir (*Pseudotsuga menziesii*), Ponderosa Pine (*Pinus ponderosa*) and Black Oak (*Quercus kelloggii*) in this zone.

QI

CALIFORNIA BUCKEYE ALLIANCE

California Buckeye (*Aesculus californica*) has been mapped very rarely in pure stands or as an understory species with Gray Pine (*Pinus sabiniana*) in this area. It is a dominant hardwood only on mesic slopes within the Upper Foothills Metamorphic Belt Subsection at elevations below about 2200 ft (671 m).

QJ

COTTONWOOD - ALDER ALLIANCE

The Cottonwood - Alder Alliance of this zone is defined by a mixture of both Fremont Cottonwood (*Populus fremontii*) and White Alder (*Alnus rhombifolia*). It occurs sparsely in this region, since both species reach their easternmost distributions in northern California here. The Alliance has been identified in the Diamond Mountains – Crystal Peak, Tahoe – Truckee Subsections and along the western edge of the Upper Foothills Metamorphic Belt Subsection at elevations below about 5600 ft (1708 m). Fremont Cottonwood - White Alder stands are adjacent to other riparian shrubs and herbaceous species, upland trees such as Ponderosa Pine (*Pinus ponderosa*), Douglas-Fir (*Pseudotsuga menziesii*) and Oaks (*Quercus* spp.), and Great Basin shrubs such as Big Basin Sagebrush (*Artemisia tridentata* ssp. *tridentata*) and Bitterbrush (*Purshia tridentata*).

QK

BLACK OAK ALLIANCE

Black Oak (Quercus kelloggii) forms one of the most common and wide-ranging hardwood alliances in this zone. As a dominant hardwood, it is found on mesic soils up to an elevation of about 6600 ft (2012 m) on both west and east slopes of the Sierra Nevada. It also occurs as a major understory component within most conifer alliances, including Douglas-Fir, Ponderosa Pine, Douglas-Fir - Pine, Knobcone Pine, Jeffrey Pine, Mixed Conifer - Pine, Mixed Conifer – Fir, White Fir, Eastside Pine, and Mixed Conifer - Fir. The Black Oak Alliance is found most abundantly in the Granitic and Metamorphic Foothills and the Upper Foothills Metamorphic Belt Subsections and has been mapped less frequently in eleven other subsections. Black Oak often intermixes at varying stand densities with Canyon Live Oak (Q. chrysolepis), creating mixed stands in the Montane and Interior Mixed Hardwood Alliances. Generally speaking, Black Oak dominates sites with better growing conditions than does Canyon Live Oak. In areas of topographic shading or along riparian corridors, Bigleaf Maple (Acer macrophyllum), Dogwood (Cornus spp.), White Alder (Alnus rhombifolia), Tanoak (Lithocarpus densiflorus) and Valley Oak (Q. lobata) may become common but minor associates.

QL

VALLEY OAK ALLIANCE

The largest oak in North America, Valley Oak (Quercus lobata), typically reaches heights of up to 90 ft (27 m) tall and up to 4 ft (1.2 m) in diameter in California. This species grows quickly, having a lifespan of nearly 600 years. It occurs in pure hardwood stands or in mixed stands with Ponderosa Pine (Pinus ponderosa) on the westside on deep stable soils in valley bottoms or along streams below about 2800 ft (854 m) in this area of the northern Sierras. The Valley Oak Alliance has been identified and mapped occasionally within the Granitic and Metamorphic Foothills and Upper Foothills Metamorphic Belt Subsections. Annual grasses and herbaceous species commonly occur in these open stands, forming oak savannas.

QM

BIGLEAF MAPLE ALLIANCE

The Bigleaf Maple Alliance may occur in pure stands of Bigleaf Maple (Acer macrophyllum) or Maples mixed with Dogwoods (Cornus spp.). This type is also found as a minor understory component of several conifers such as Douglas-Fir (Pseudotsuga menziesii) and Ponderosa Pine (Pinus ponderosa) on mesic soils or shaded sites. As a dominant hardwood, it has been identified sparsely at elevations up to about 5600 ft (1708 m) on the westside of the northern Sierra Nevadas along riparian areas or on shady north aspects. These sites are located in the Fredonyer Butte – Grizzly Peak, Bucks Lake, Granitic and Metamorphic Foothills, and Upper Foothills Metamorphic Belt Subsections.

QO

WILLOW ALLIANCE

The Willow Alliance is a wide-ranging diverse type on both western and eastern Sierran slopes. Species of treelike Willows (Salix spp.) dominate the hardwood mixture. It occurs in pure stands along streams and moist canyon bottoms as a hardwood alliance as well as a minor understory hardwood in almost all conifer alliances within those areas. Hardwoods and shrubs such as Quaking Aspen (Populus tremuloides), White Alder (Alnus rhombifolia), Mountain Alder (A. incana ssp. tenuifolia), and Fremont and Black Cottonwoods (Populus fremontii, P. balsamifera ssp. trichocarpa) may be associated with the Willow Alliance in minor amounts, often forming mixed types of riparian hardwoods. It has been mapped sparsely in nine subsections at elevations between about 500 - 8200 ft (153 - 2501 m).

QQ

QUAKING ASPEN ALLIANCE

Quaking Aspen (Populus tremuloides), a deciduous hardwood with an extensive range in the Western Hemisphere, has been mapped in widely scattered areas of this zone. It occurs in pure stands or as

scattered individuals throughout moist areas and has been mapped as a dominant hardwood alliance at elevations between about 5000 – 9000 ft (1524 – 2745 m) in this zone. It is commonly associated with conifer species such as Red and White Fir (*Abies magnifica*, *A. concolor*) and Lodgepole Pine (*Pinus contorta* ssp. *murrayana*), and those in the Eastside Pine and Mixed Conifer - Fir Alliances. The Quaking Aspen Alliance has been mapped in eleven subsections and is usually found adjacent to upper montane meadows and streams associated with Willows (*Salix* spp.) or Black Cottonwood (*Populus balsamifera* ssp. *trichocarpa*), but also is found on drier sites in the vicinity of Great Basin shrubs such as Mountain and Low Sagebrush (*Artemisia tridentata* ssp. *vaseyana*, *A. arbuscula*).

QS WILLOW - ASPEN ALLIANCE

The main distribution of Quaking Aspen in California is in the North and South Sierran Calveg zones, but it occurs much more commonly in the Rocky Mountain, Intermountain and North Central states. A combination of Willows (*Salix* spp.), an extensively occurring genus, and Quaking Aspen (*Populus tremuloides*) have been mapped as two co-dominant hardwoods where the species commonly overlap in the Carson Range Subsection. Such sites have also been identified in widely scattered small riparian or meadow areas within ten other subsections of this zone, elevations generally falling within about 4900 – 8000 ft (1495 – 2440 m). Trees in the Mixed Conifer - Fir Alliance are often found in the general vicinity of these sites, in addition to Black Cottonwood (*Populus balsamifera* ssp. *trichocarpa*), which may become a minor component of this alliance.

QT TANOAK ALLIANCE

Tanoak (*Lithocarpus densiflorus*), a very shade-tolerant evergreen, reaches its northeastern most range limits in the northern Sierras at low elevations, as does its associate Pacific Madrone (*Arbutus menziesii*). This Alliance is defined by the dominance of Tanoak alone or in combination with Pacific Madrone (*Arbutus menziesii*) in their areas of overlap in this zone. The Tanoak Alliance has been mapped in the western Sierra Nevada below about 4400 ft (1342 m) only in the Granitic and Metamorphic Foothills and Upper Foothill Metamorphic Belt Subsections, generally on deep, well-drained mesic soils. Common associates include Douglas-Fir (*Pseudotsuga menziesii*), Ponderosa Pine (*Pinus ponderosa*), Black and Canyon Live Oaks (*Quercus kelloggii*, *Q. chrysolepis*) and California Bay (*Umbellularia californica*). Drier granitic type soils often result in an increased Pacific Madrone abundance or dominance in its own alliance.

QW INTERIOR LIVE OAK ALLIANCE

Interior Live Oak (*Quercus wislizenii*), another shade-tolerant evergreen, reaches its easternmost distribution in the Granitic and Metamorphic Foothills and Upper Foothills Metamorphic Belt Subsections of this zone, where it has been mapped abundantly as a dominant hardwood. The Interior Live Oak Alliance also has been identified more sparsely in semi-open or closed stands in the Batholith and Volcanic Flows Subsection. Mapped elevations are generally less than about 3400 ft (1036 m). As elevation increases, the associated hardwoods Black and Canyon Live Oaks (*Q. kelloggii*, *Q. chrysolepis*), become more prevalent on cooler north and east aspects to form their own alliances at these elevations. Ponderosa Pine (*Pinus ponderosa*) and, to a lesser extent, Gray Pine (*P. sabiniana*) are typical conifer associates of this type.

QX BLACK COTTONWOOD ALLIANCE

Black Cottonwood (*Populus balsamifera* ssp. *trichocarpa*) occurs in the northern Sierra Nevada Mountains more commonly than does Fremont Cottonwood (*Populus fremontii*), but their ranges occasionally overlap. Over its broad range in California, it may occur at elevations up to about 9000 ft (2800 m). In this zone, it has been mapped as a dominant hardwood sparsely in the Greenville-Graeagle, Upper Batholith and

Volcanic Flows and Tahoe – Truckee Subsections at elevations between about 3400 – 7800 ft (1036 – 2379 m). Being shade intolerant, it requires freshly deposited alluvial materials for its maintenance in the absence of competing trees, and stands are often even-aged as a result of episodic flood events. However, tree or shrub Willows (Salix spp.), are often present as a minor component in this type. At higher elevations and towards eastern California, Black Cottonwood may occur in association with a few Quaking Aspens (Populus tremuloides) and with White Alders (Alnus rhombifolia) at lower elevations towards the west.

QY WILLOW - ALDER ALLIANCE

This Alliance includes any tree species of Willow (Salix spp.) combined with White or Mountain Alders (Alnus rhombifolia, A. incana ssp. tenuifolia) occurring together in stream or seepage areas where neither is clearly dominant in the riparian mixture. This wide-ranging type has been mapped occasionally within ten subsections of this zone at elevations generally below 7400 ft (2256 m). Common associates include upland conifers such as White Fir (Abies concolor) and Ponderosa Pine (Pinus ponderosa) in addition to shrubs such as species of Gooseberry and Currant (Ribes spp.), Blackberry and other edible berries (Rubus spp.), Wild Rose (Rosa spp.) and Poison Oak (Toxicodendron diversilobum) along with various graminoids and forbs.

TX MONTANE MIXED HARDWOODS ALLIANCE

This mixed hardwood alliance generally occurs on sites favorable to the growth of mid-montane conifers such as Ponderosa Pine (Pinus ponderosa) and usually above Interior Mixed Hardwood sites. This type has been mapped at elevations below about 5600 ft (1708 m) within six subsections of this zone. The mixture includes any combination of non-dominant Black Oak (Quercus kelloggii), Pacific Madrone (Arbutus menziesii), Tanoak (Lithocarpus densiflorus) and/or Tree Chinquapin (Chrysolepis chrysophylla) in this area. Other species such as Canyon or Interior Live Oak (Q. chrysolepis, Q. wislizenii) may be included, but are not indicator species. The principal overstory conifer associates are Douglas-Fir (Pseudotsuga menziesii), Ponderosa Pine and others such as Incense Cedar (Calocedrus decurrens) or Sugar Pine (P. lambertiana).

WD DOGWOOD ALLIANCE

Hardwood species of Dogwood such as Mountain Dogwood (Cornus nuttallii) and Miner's Dogwood (Cornus sessilis) are occasionally mapped along stream banks or in shaded forest areas as understory to conifers. This Alliance occurs very infrequently in the Upper Foothills Metamorphic Belt and Batholith and Volcanic Flows Subsections at an elevation range of 3280 - 5084 ft (1000 - 1550 m). It also may include some small tree or shrubby species such as Brown (Cornus glabrata) or American (Cornus sericea) Dogwoods.

SHRUBS AND CHAPARRAL

AX ALPINE MIXED SCRUB ALLIANCE

These mountain-top communities are often low graminoid and semi-woody subshrub species with a mixture of some fully woody dwarf or taller shrubs. This type is locally common in limited areas of three subsections (Tahoe-Truckee, Glaciated Batholith and Volcanic Flows, and Markleeville) at elevations above about 8200 ft (2500 m) on the eastside. Species composition varies considerably and usually is quite diverse, often dependent on the presence of late-lying snowbanks and other moisture sources. In the northern Sierra Nevada, the most common dwarf shrubs in the Alpine Mixed Scrub Alliance are Creambush Oceanspray (Holodiscus discolor), Greene Goldenweed (Ericameria greenei) and Mountain

White Heather (Cassiope mertensiana). These may be augmented by taller shrubs such as Sierra, Geyer's, Jepson's, and Gray-leaved Sierra Willows (Salix eastwoodiae, S. orestera, S. jepsonii, S. geeyeriana) and others such as Bush Cinquefoil (Potentilla fruticosa) and Sierra Primrose (Primula suffrutescens). East of the Sierra crest, as in the Carson Range Subsection, Great Basin shrubs may be evident in the mixture, such as Mountain Sagebrush (Artemisia tridentata ssp. vaseyana) or Bitterbrush (Purshia tridentata var. tridentata). Some elements of the herbaceous Alpine Mixed Grasses and Forbs Alliance may also be present, such as grasses and sedges (Poa spp., Elymus spp., Carex spp.) and Pussytoes (Antennaria media).

BB BITTERBRUSH ALLIANCE

Bitterbrush (Purshia tridentata) generally occurs on dry slopes and plains and has been mapped sparsely in this zone as a dominant shrub from about 4800 – 7200 ft (1464 – 2196 m) within three subsections east of the Sierran crest. This Alliance is usually found on flat or gentle slopes in the vicinity of the Big Sagebrush Alliance and adjacent to the Eastside Pine and Bitterbrush – Sagebrush Alliances. This high value forage species is also associated with grasses in open stands such as Squirreltail (Elymus elymoides) and other Wild ryegrasses or Wheatgrasses (Elymus spp.), Fescue (Festuca spp.), non-natives such as Crested Wheatgrass (Agropyron desertorum), and others.

BL LOW SAGEBRUSH ALLIANCE

Low Sagebrush (Artemisia arbuscula) is the dominant shrub of this eastside Alliance. It is generally restricted to basins with clay or saline-alkaline soils which are intermittently flooded, as well as to terraces with hardpan or heavy clay substrates in moderate to higher altitudes. The Alliance has been mapped prominently in the Carson Range and less abundantly in four other subsections of this zone at elevations from about 5600 – 10,200 ft (1708 – 3111 m). Shrub and tree associates most often include Mountain Sagebrush (Artemisia tridentata ssp. vaseyana), Curlleaf Mountain Mahogany (Cercocarpus ledifolius), and high-elevation conifers such as Lodgepole Pine (Pinus contorta ssp. murrayana), Red Fir (Abies magnifica), Whitebark Pine (P. albicaulis) and Western White Pine (P. monticola), and grass taxa such as Needlegrass (Achnatherum spp.), Arrowleaf Balsamroot (Balsamorhiza sagittaria) and a rich variety of forbs.

BM CURLLEAF MOUNTAIN MAHOGANY ALLIANCE

This alliance occurs on gently to steeply sloping mountain uplands and ridge tops usually in association with rocky outcrops. Curlleaf Mountain Mahogany (Cercocarpus ledifolius) usually occurs on xeric sites in open stands as the dominant shrub species in association with Great Basin shrubs such as Mountain Sagebrush (Artemisia tridentata ssp. vaseyana), Bitterbrush (Purshia tridentata) and grasses such as Idaho Fescue (Festuca idahoensis) and Squirreltail (Elymus elymoides). On more mesic sites, associates may include scattered Ponderosa Pine (Pinus ponderosa), Jeffrey Pine (P. jeffreyi) or Lodgepole Pine (P. contorta ssp. murrayana) specimens. Curlleaf Mountain Mahogany may adapt a shrub form or a small tree form that occurs in dense thickets. This alliance has been mapped in scattered and patchy sites within seven eastside subsections at elevations up to about 10,000 ft (3050 m).

BQ GREAT BASIN MIXED SCRUB ALLIANCE

A mixture of common Great Basin shrubs defines the Great Basin Mixed Scrub Alliance in which no single species is dominant. It is a common eastside type in northern areas of the Carson Range Subsection and has been mapped more sparsely in the Tahoe - Truckee, Eastern Slopes and Glaciated Batholith and Volcanic Flows Subsections at elevations ranging from about 5000 – 9200 ft (1524 – 2806 m). The species mixture includes Mountain Sagebrush (Artemisia tridentata ssp. vaseyana), shrub form of Curlleaf Mountain Mahogany (Cercocarpus ledifolius), Bitterbrush (Purshia tridentata) and other shrubs. This type

is spatially associated with the Eastside Pine, Lodgepole Pine (*Pinus contorta* ssp. *murrayana*) and Mixed Conifer - Fir Alliances.

BR

RABBITBRUSH ALLIANCE

A single or (more rarely) a combination of several species of Rabbitbrush (*Chrysothamnus* spp.) may become dominant in this Alliance. In this area, it is more often associated with conifers in the Eastside Pine and Mixed Conifer – Fir Alliances, having been mapped occasionally in the Tahoe - Truckee and Carson Range Subsections, mainly at elevations up to about 7800 ft (2380 m). Small inclusions of Great Basin shrubs such as Bitterbrush (*Purshia tridentata*) and Big Basin and Mountain Sagebrush (*Artemisia tridentata* ssp. *tridentata*, *A. t.* ssp. *vaseyana*) may be present in this Alliance in minor amounts in addition to abundant dry grasses and forbs.

BS

BIG SAGEBRUSH ALLIANCE

Big Sagebrush (*Artemisia tridentata*) has not been differentiated into subspecies in this alliance, including Big Basin (ssp. *tridentata*), Mountain (ssp. *vaseyana*) and perhaps others in this area. It has been mapped on dry slopes and plains from about 4000 – 10,000 ft (1220 – 3050 m) both east and west of the Sierran crest, becoming prominent in the Diamond Mountain - Crystal Peak, Fredonyer Butte – Grizzly Peak, Frenchman and Tahoe –Truckee Subsections. The type has also been identified less commonly within six others and is usually found on frigid, coarse-grained soils with a lack of soil profile development, although soils may be deep. Associated species include yellow pines (*Pinus ponderosa*, *P. jeffreyi*) in the Eastside Pine Alliance, Firs (*Abies* spp.) and Lodgepole Pine (*P. contorta* ssp. *murrayana*) in the Mixed Conifer – Fir Alliances, Bitterbrush (*Purshia tridentata*), Snowbrush (*Ceanothus velutinus*), and a variety of dry grasses and forbs.

BX

GREAT BASIN - MIXED CHAPARRAL TRANSITION ALLIANCE

This eastside alliance is a mixture of montane hard chaparral species such as *Ceanothus* species like Snowbrush (*C. velutinus*) and Mountain Whitethorn (*C. cordulatus*), Bush Chinquapin (*Chrysolepis sempervirens*), Greenleaf Manzanita (*Arctostaphylos patula*), Thimbleberry (*Rubus parviflorus*) and Snowberry (*Symphoricarpos* spp.) with an equivalent vegetation cover of Great Basin shrub species such as Mountain and Big Basin Sagebrush (*Artemisia tridentata* ssp. *vaseyana*, *A. t.* ssp. *tridentata*), Low Sagebrush (*A. arbuscula*), Bitterbrush (*Purshia tridentata*) and Curleaf Mountain Mahogany (*Cercocarpus ledifolius*). It is sometimes associated with conifer plantations or open areas within the Eastside Pine or Mixed Conifer – Fir Alliances and these sites are often adjacent to conifers such as White and Red Firs (*Abies concolor*, *A. magnifica*), and Lodgepole and Jeffrey Pines (*Pinus contorta* ssp. *murrayana*, *P. jeffreyi*). This transitional type has been identified mainly at mid- to upper-montane elevations of about 5000 – 9400 ft (1524 – 2867 m) and has been mapped abundantly in the northern and eastern areas of the Tahoe - Truckee and Carson Range and Eastern Slopes Subsections and less frequently in the Glaciated Batholith and Volcanic Flows Subsection.

C1

ULTRAMAFIC MIXED SHRUB ALLIANCE

Serpentinized and ultramafic rocks do not occur in this zone except for very sparse occurrences towards the west and northwest. Some vegetated ultramafic sites occur in the Granitic and Metamorphic Foothills Subsection and were mapped sparsely as the Ultramafic Mixed Shrub Alliance there and in the Upper Foothills Metamorphic Belt under appropriate conditions. Shrubs such as Wedgeleaf *Ceanothus* (*Ceanothus cuneatus*), Whiteleaf Manzanita (*Arctostaphylos viscida*), Hoary Coffeeberry (*Rhamnus tomentella*), Huckleberry Oak (*Quercus vaccinifolia*) and Poison Oak (*Toxicodendron diversilobum*) are identified in this type. Occasional Gray Pine (*Pinus sabiniana*), McNab Cypress (*Cupressus* or *Callitropsis*

macnabiana) and California Bay (Umbellularia californica) may occur on these sites minimally. Mapped elevations are less than 3500 ft (1068 m).

CA

CHAMISE ALLIANCE

This fire-adapted westside Alliance, dominated by Chamise (Adenostoma fasciculatum), grows on mesic and thermic soils and steep slopes, having been mapped at elevations up to about 3000 ft (915 m) within this zone. It is found sparsely in the Upper Foothills Metamorphic Belt Subsection, mainly in El Dorado and Amador Counties. Canyon Live Oak (Quercus chrysolepis) stands and shrubs of the Lower Montane Mixed Chaparral Alliance such as Wedgeleaf Ceanothus (Ceanothus cuneatus) and Whiteleaf Manzanita (Arctostaphylos viscida) may be found in close proximity to the Chamise Alliance in this zone.

CC

CEANOTHUS CHAPARRAL

The Ceanothus Chaparral Alliance occasionally occurs in the Sierra Nevada Mountains at elevations below about 4500 ft (1372 m). It differs from the Lower Montane Mixed Chaparral Alliance by having a preponderance of lower-elevation Ceanothus species such as (non-dominant) Wedgeleaf Ceanothus, Lemmon Ceanothus, (non-dominant) Deerbrush and Chaparral Whitethorn (Ceanothus cuneatus, C. lemmonii, C. integerrimus, C. leucodermis) in the shrub mixture. Species more typical of higher elevations such as Mountain Whitethorn (C. cordulatus) and Snowbrush (C. velutinus) may also appear in this mixture as non-dominant shrubs. This alliance also may include, in minor quantities, some of the more common mixed chaparral shrubs such as Whiteleaf and Common Manzanitas (Arctostaphylos viscida, A. manzanita), Chamise (Adenostoma fasciculatum), Fremont or Wavyleaf Silk-tassel (Garrya fremontii, G. elliptica), Birchleaf Mountain Mahogany (Cercocarpus betuloides), Poison Oak (Toxicodendron diversilobum), Shrub Oaks (Quercus spp.) and other low-elevation shrub species below productive coniferous and hardwood sites. Individual sites may support pure stands of these shrubs such as in the Wedgeleaf Ceanothus Alliance. The Ceanothus Chaparral Alliance has been mapped very sparsely within the Upper Foothills Metamorphic Belt and Upper Batholith and Volcanic Flows Subsections at elevations below about 6600 ft (2012 m).

CE

MOUNTAIN MISERY ALLIANCE

Mountain Misery (Chamaebatia foliolosa), an evergreen, is a strongly scented shrub that is moderately shade-tolerant and persistent under open conifer canopies, dominates the shrub layer of this alliance. It may occur over large parts of forested landscapes as a low-growing mat or short erect shrub that spreads vegetatively by sprouting from underground roots and rhizomes after fires. Its tangled and deeply rooting root mass tends to inhibit conifer regeneration while stabilizing some slopes. This type has been mapped sparsely in this area along the eastern sections of the Upper Foothills Metamorphic Belt and Batholith and Volcanic Flows Subsections at elevations between about 2600 – 5200 ft (792 – 1586 m). It is found mainly within the Mixed Conifer – Pine, Ponderosa Pine (Pinus ponderosa) and Douglas-Fir (Pseudotsuga menziesii) – Ponderosa Pine Alliances.

CG

GREENLEAF MANZANITA ALLIANCE

Greenleaf Manzanita (Arctostaphylos patula) may dominate sites at elevations above the Whiteleaf Manzanita Alliance in proximity to the Mixed Conifer – Fir and Jeffrey Pine Alliances. Other mid-montane shrubs may be minimally present in this alliance, including Deerbrush (Ceanothus integerrimus), Snowbrush (C. velutinus), Low Sagebrush (Artemisia arbuscula) and Bush Chinquapin (Chrysolepis sempervirens). The ability of the species to often sprout after fire from a lignotuber in Sierra Nevada populations and the long-term viability of its seeds allow it to reoccupy a site within a decade of ground disturbance. This alliance becomes locally prominent in the Carson Range Subsection and less abundant in

the Tahoe-Truckee and Eastern Slopes Subsections, having been mapped at elevations between about 5000 – 8800 ft (1524 -2440 m).

CH

HUCKLEBERRY OAK ALLIANCE

Huckleberry Oak (*Quercus vaccinifolia*) occurs in pure stands or mixed with Pinemat Manzanita (*Arctostaphylos nevadensis*) on very shallow, stoney or gravelly soils and ultrabasic soils in this zone. The alliance in which it is the dominant shrub has been mapped abundantly in the Upper Batholith and Glaciated Batholith and Volcanic Flows Subsections and more sparsely in three other subsections at elevations between about 4400 – 9200 ft (1342 – 2806 m). It represents an edaphic habitat on ridge tops and elsewhere that identifies poor conifer production sites and often occurs in openings within Red Fir (*Abies magnifica*), Lodgepole Pine (*Pinus contorta* ssp. *murrayana*) and Mixed Conifer – Fir forests. Greenleaf Manzanita (*Arctostaphylos patula*), Mountain Alder (*Alnus incana* ssp. *tenuifolia*), Bush Chinquapin (*Chrysolepis sempervirens*), Mountain Whitethorn (*Ceanothus cordulatus*), and Bitter Cherry (*Prunus emarginata*) are minor associated shrub species.

CI

DEERBRUSH ALLIANCE

Deerbrush (*Ceanothus integerrimus*) typically occurs as a successional species after stand-replacing disturbances such as fire, landslide, and logging. Its tree associates in this area include Douglas- Fir (*Pseudotsuga menziesii*), Ponderosa Pine (*Pinus ponderosa*), Black Oak (*Quercus kelloggii*) and possibly others in the Mixed Conifer - Pine Alliance. It has been mapped very sparsely in the elevation range of about 1800 – 6200 ft (548 – 1890 m) within the Greenville - Graeagle, Bucks Lake, Granitic and Metamorphic Foothills and Upper Foothills Metamorphic Belt Subsections.

CL

WEDGELEAF CEANOTHUS ALLIANCE

This Alliance is dominated by Wedgeleaf Ceanothus (*Ceanothus cuneatus*) and occurs on well drained soils of dry, exposed slopes and ridges. It has been mapped sparsely in the Diamond Mountains – Crystal Peak, Greenville - Graeagle and Frenchman Subsections at elevations up to about 6000 ft (1830 m) as a nearly pure, dense thicket or in more open stands mixed with minor amounts of other shrubs and trees. These associated species include Greenleaf Manzanita (*Arctostaphylos patula*), Deerbrush (*Ceanothus integerrimus*), Black Oak (*Quercus kelloggii*), Ponderosa and Jeffrey Pine (*Pinus ponderosa*, *P. jeffreyi*), Douglas-Fir (*Pseudotsuga menziesii*) and Great Basin shrubs such as Big Sagebrush (*Artemisia tridentata*) towards the east.

CM

UPPER MONTANE MIXED SHRUB ALLIANCE

This mixed shrub alliance occurs in upper montane positions on harsh sites such as exposed ridge tops or under excessively drained soils conditions. Sites are typically below about 9400 ft (2928 m) and have been mapped abundantly in the Upper Batholith and Volcanic Flows and Glaciated Batholith and Volcanic Flows Subsections and occasionally in four others. Major shrub species in this mixture include Huckleberry Oak (*Quercus vaccinifolia*), Creeping Snowberry (*Symphoricarpos mollis* or *acutus*), Pinemat Manzanita (*Arctostaphylos nevadensis*) and Bush Chinquapin (*Chrysolepis sempervirens*). Red Fir (*Abies magnifica*), Lodgepole Pine (*Pinus contorta* ssp. *murrayana*) and other subalpine conifers such as Whitebark Pine (*P. albicaulis*) are spatially associated with this type. Minor associates include Greenleaf and Whiteleaf Manzanita (*Arctostaphylos patula*, *Arctostaphylos viscida*), Bitter Cherry (*Prunus emarginata*) and Mountain Whitethorn (*Ceanothus cordulatus*) towards the west. Big Sagebrush (*Artemisia tridentata*), Bitterbrush (*Purshia tridentata*), and Mountain or Parish's Snowberry (*Symphoricarpos rotundifolius* or *S. parishii*) occur on the east side on some of these sites.

CN

PINEMAT MANZANITA ALLIANCE

Pinemat Manzanita (*Arctostaphylos nevadensis*), a dwarf shrub, is the sole dominant of this relatively uncommon alliance. It has been mapped occasionally in the Glaciated Batholith and Volcanic Flows, Bucks Lake, Eastern Slopes and Carson Range Subsections at elevations generally between about 5600 – 9400 ft (1708 – 2867 m). Sites are often harsh and adjacent to barren areas and to upper montane conifers such as Lodgepole Pine (*Pinus contorta* ssp. *murrayana*) and Red Fir (*Abies magnifica*). Mountain and Low Sagebrushes (*Artemisia tridentata* ssp. *vaseyana*, *A. arbuscula*) are often found in adjacent areas.

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 Carson Range and Eastern Slopes Subsections mostly at mid- to upper-montane elevations between about 6400 – 9800 ft (1952 – 2990 m). Overstory conifers associated with these sites include Red Fir (*Abies magnifica*) and Western White and Lodgepole Pines (*Pinus monticola*, *P. contorta* ssp. *murrayana*). Shrubs of the Upper Montane Mixed Chaparral Alliance such as Snowbrush (*Ceanothus velutinus*) and Great Basin shrubs such as Mountain Sagebrush (*Artemisia tridentata* ssp. *vaseyana*) and Low Sagebrush (*Artemisia arbuscula*) may also be found adjacent to or within these stands.

CQ

LOWER MONTANE MIXED CHAPARRAL ALLIANCE

This lower elevation mixed westside shrub alliance has been mapped abundantly in the Granitic and Metamorphic Foothills and Upper Foothills Metamorphic Belt Subsections and occasionally in three others at elevations below about 5200 ft (1586 m). It is a floristically diverse type associated with conifer alliances such as the Douglas-Fir - Pine, Ponderosa Pine, Mixed Conifer – Pine and Gray Pine. Canyon Live Oak (*Quercus chrysolepis*) is the typical hardwood of the vicinity. Included in the mixture usually are combinations of Whiteleaf and Common Manzanitas (*Arctostaphylos viscida*, *A. manzanita*), Wedgeleaf and Lemmon Ceanothus and Chaparral Whitethorn (*Ceanothus cuneatus*, *C. lemmonii*, *C. leucodermis*), Chamise (*Adenostoma fasciculatum*), Fremont and Wavyleaf Silktassel (*Garrya fremontii*, *G. elliptica*), Birchleaf Mountain Mahogany (*Cercocarpus betuloides*), Poison Oak (*Toxicodendron diversilobum*), shrub Oaks (*Quercus* spp.), Hoary Coffeeberry (*Rhamnus tomentella*) and other lower elevation shrub species. Individual sites many support pure stands of these shrubs such as in the Wedgeleaf Ceanothus Alliance.

CS

SCRUB OAK ALLIANCE

The Scrub Oak Alliance has been mapped and identified below about 6400 ft (1952 m) in six subsections of this zone. It is dominated by single species or mixtures of Scrub Oak (*Quercus berberidifolia*), Shrub Interior Live Oak (*Q. wislizenii* var. *frutescens*), and/or Shrub Canyon Live Oak (*Q. chrysolepis* var. *nana*). As there is much hybridization among *Quercus* species, positive identifications become difficult. Most species of Oak in this Alliance stump sprout after fire and may fully occupy the site within ten years. Other associated shrubs include Birchleaf Mountain Mahogany (*Cercocarpus betuloides*), Poison Oak (*Toxicodendron diversilobum*), and other mesic chaparral species. Arboreal forms of these associated oaks may be present on or offsite, in addition to Gray and Ponderosa Pines (*Pinus sabiniana*, *P. ponderosa*).

CV

SNOWBRUSH ALLIANCE

Snowbrush (*Ceanothus velutinus* var. *velutinus*) is a dominant shrub species on many eastside slopes of the Sierra Nevada. In this zone, it is a locally prominent type in the Tahoe-Truckee Subsection and occurs occasionally in four others at elevations between about 5000 – 10,000 ft (1524 – 3050 m) in the elevation range of the Upper Montane Mixed Chaparral Alliance. Snowbrush associates with conifers in the Mixed

Conifer – Fir and Eastside Pine Alliances such as Jeffrey Pine (*Pinus jeffreyi*) and Firs (*Abies* spp.). This Alliance also grows adjacent to both the Big Sagebrush and Upper Montane Mixed Chaparral Alliances and to the Great Basin – Mixed Chaparral Transition Alliance that is defined by shrubs present in both types.

CW

WHITELEAF MANZANITA ALLIANCE

Whiteleaf Manzanita (*Arctostaphylos viscida*) occurs in pure stands in scattered areas towards the western edges of the Upper Foothills Metamorphic Belt and more sparsely in the Granitic and Metamorphic Foothills and Greenville-Graeagle Subsections. This Alliance has been identified mainly at elevations below about 5000 ft (1524 m) in this zone, typically occurring adjacent to the Ponderosa Pine, Douglas-Fir - Pine and Lower Montane Mixed Chaparral Alliances.

CX

UPPER MONTANE MIXED CHAPARRAL ALLIANCE

The Upper Montane Mixed Chaparral Alliance is a very widespread and diverse mixed shrub type that occurs abundantly in seven subsections and occasionally in thirteen others at moderate to high elevations of this zone. Chaparral species such as Greenleaf Manzanita (*Arctostaphylos patula*), Mountain Whitethorn (*Ceanothus cordulatus*), Snowbrush (*Ceanothus velutinus*) and Deerbrush (*Ceanothus integerrimus*) are indicators of this type. Deerbrush is found extensively on deep mesic soils of the westside of the Northern Sierras. Greenleaf Manzanita and Mountain Whitethorn are found most commonly associated with the Mixed Conifer - Fir, Red Fir, and White Fir Alliances. On eastside Sierran slopes, Big Sagebrush (*Artemisia tridentata*) and Squirreltail (*Elymus elymoides*) may also occur in this Alliance. Whiteleaf Manzanita (*Arctostaphylos viscida*) may be present on the westside foothills at lower elevations of this type, representing a transition between the Lower Montane Mixed Chaparral Alliance and this Alliance. Red and White Firs (*Abies magnifica*, *A. concolor*) and Ponderosa Pine (*Pinus ponderosa*) are often found in the immediate vicinity of this type.

CY

MOUNTAIN WHITETHORN ALLIANCE

Mountain Whitethorn (*Ceanothus cordulatus*), a fire-dependent evergreen species, is one of the first shrubs to appear on sites denuded by fire or logging. It sometimes dominates such areas, this alliance having been mapped very sparsely in the Carson Range, Tahoe-Truckee, Glaciated Batholith and Volcanic Flows and the eastern most edge of the Upper Batholith and Volcanic Flows Subsections. These sites are in the elevation range of about 6200 – 8400 ft (1890 – 2562 m) and are most often adjacent to Red Fir (*Abies magnifica*) and Mixed Conifer - Fir stands.

KQ

ASPEN (SHRUB)

Quaking Aspen (*Populus tremuloides*) has been mapped in its shrub form occasionally in the Carson Range Subsection and more sparsely in the Glaciated Batholith and Volcanic Flows and Tahoe Valley Subsections of this zone. Mapped elevations are of the order 6600-8800 ft (2012 - 2684 m). Edaphic and microsite conditions apparently limit the water availability in some areas that enable Aspens to reach tree size. These include the occurrence of lava beds that drain extremely rapidly as snow melts in snow accumulation areas, small ridges that increase water runoff in summer and lower gradient areas that may also lose their surface water quickly in spring and summer such as those on south-facing slopes. Shrubby Aspens in this zone are often adjacent to arboreal Aspens, upper elevation conifers such as Red Fir (*Abies magnifica*), Western White Pine (*Pinus monticola*), Mountain Hemlock (*Tsuga mertensiana*) and Lodgepole Pine (*P. contorta* ssp. *murrayana*) and shrubs such as Huckleberry Oak (*Quercus vaccinifolia*) and Snowbrush (*Ceanothus velutinus*).

NI

NISSEAN MANZANITA

Nissenan Manzanita (Arctostaphylos nissenana) is an endemic and rare evergreen shrub that is mostly known from portions of Eldorado County, where it occurs in a number of large stands on open, rocky ridges. It has been mapped very sparsely in this zone within the Upper Foothills Metamorphic Belt at elevations between about 600 – 3600 ft (183 – 1098 m). Knobcone and Ponderosa Pines (Pinus attenuata, P. ponderosa) and shrubs such as Whiteleaf Manzanita (A. viscida) are found in the vicinity of these sites.

TA

MOUNTAIN (THINLEAF) ALDER ALLIANCE

Mountain or Thinleaf Alder (Alnus incana ssp. tenuifolia) is a dominant high-elevation small tree or tall shrub species, generally occurring in pure stands between about 4200 – 8800 ft (1280 – 2684 m) in this region. As a dominant shrub, it has been identified in small, very scattered stands in thirteen subsections of this zone. 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 sometimes adjacent to White Fir, Mixed Conifer - Fir, and Red Fir sites. Minor inclusions of tree or shrub Willows (Salix spp.) or Mountain Maple (Acer glabrum) may occur in this type, but the density of Mountain Alder stands limits the growth of other species aside from some aquatic gaminoids and forbs.

TB

BITTERBRUSH - SAGEBRUSH ALLIANCE

On eastside northern Sierra slopes, Bitterbrush (Purshia tridentata) and upland Sagebrushes such as Big Basin and Mountain (Artemisia tridentata ssp. tridentata, A. t. ssp. vaseyana) occasionally mix where the combination of the two genera have dominance of the shrub layer, forming the Bitterbrush - Sagebrush Alliance. It has been mapped frequently in the north and eastern portions of the Tahoe - Truckee Subsection and less commonly in the Carson Range and Eastern Slopes Subsections, mostly within an elevation range of about 4800 – 8000 ft (1464 – 2440 m). This type is spatially associated most commonly with the Eastside Pine Alliance.

TN

BLACK SAGEBRUSH ALLIANCE

Black Sagebrush (Artemisia nova) has been identified more frequently in the Great Basin Calveg zone than in the eastside Sierra Nevada, although it has been mapped sparsely in the Carson Range and Tahoe - Truckee Subsections of the northern Sierras in this zone. Elevations of these sites are generally between about 5200 - 7000 ft (1586 - 2135 m). In this region, it occurs in close proximity to other Great Basin shrubs such as Bitterbrush (Purshia tridentata), Big Basin or Mountain Sagebrush (Artemisia tridentata), and Curlleaf Mountain Mahogany (Cercocarpus ledifolius).

TS

SNOWBERRY ALLIANCE

The Snowberry Alliance consists of one or more Snowberry (Symphoricarpos) species that are dominant in the shrub layer, mainly Roundleaf Snowberry (S. rotundifolius) and Creeping Snowberry (S. mollis) in the northern Sierras. These stands have been mapped sparsely in the Tahoe - Truckee, Eastern Slopes and Carson Range Subsections at elevations mainly in the range of 6200 – 9400 ft (1890 – 2867 m) where they are associated with trees such as Lodgepole Pine (Pinus contorta ssp. murrayana), Red Fir (Abies magnifica), and Quaking Aspen (Populus tremuloides). Shrubs such as Mountain Sagebrush (Artemisia tridentata ssp. vaseyana), and Low Sagebrush (Artemisia arbuscula) may also be found in minor amounts within or as dominant alliances adjacent to the Snowberry Alliance.

TT

BIG BASIN SAGEBRUSH ALLIANCE

Big Basin Sagebrush (*Artemisia tridentata* ssp. *tridentata*) forms dominant stands in this alliance, being distinguished from Mountain Sagebrush (*Artemisia tridentata* ssp. *vaseyana*) in some eastside sections of the northern Sierras. In some areas, the two subspecies have not been separated, however. This type has been mapped with some abundance in the parts of the Tahoe - Truckee and Carson Range Subsections and more rarely in the Eastern Slopes Subsection, generally within the elevation range of 4800 -7400 ft (1464 – 2256 m). Eastside species such as Jeffrey Pine (*Pinus jeffreyi*), Bitterbrush (*Purshia tridentata*), Curlleaf Mountain Mahogany (*Cercocarpus ledifolius*) and Rabbitbrush (*Chrysothamnus* spp.) occur in close proximity to these sites in this zone.

TV

MOUNTAIN SAGEBRUSH ALLIANCE

The Mountain Sagebrush (*Artemisia tridentata* ssp. *vaseyana*) subspecies of Big Sagebrush (*Artemisia tridentata*) generally forms dominant stands at somewhat higher elevations than does Big Basin Sagebrush (*A. t.* ssp. *tridentata*). Within the eastside northern Sierras region, it has been mapped abundantly in the Carson Range Subsection and less frequently in the Glaciated Batholith and Volcanic Flows and Tahoe – Truckee Subsections at elevations mainly within the range of 5800 – 10,000 ft (1765 – 3050 m). Trees such as Lodgepole Pine (*Pinus contorta* ssp. *murrayana*), Red and White Fir (*Abies magnifica*, *A. concolor*), Jeffrey Pine (*P. jeffreyi*) and Quaking Aspen (*Populus tremuloides*) are found within and in close proximity to the Mountain Sagebrush Alliance. A variety of Great Basin and upper montane chaparral shrubs are also associated with this type, such as Low Sagebrush (*A. arbuscula*), Curlleaf Mountain Mahogany (*Cercocarpus ledifolius*), Snowberry (*Symphoricarpos* spp.) and Snowbrush (*Ceanothus velutinus*).

WL

WILLOW (RIPARIAN SCRUB) ALLIANCE

Any single or combination of shrub Willow(s) (*Salix* spp.) dominate the species composition of this alliance. It has been mapped in eleven subsections of this zone within a wide elevation range from about 2200 – 9600 ft (671 – 2928 m). In the Northern Sierras, species may include Arctic (*S. arctica*), Booth's (*S. boothii*), Drummond's (*S. drummondiana*), Sierra (*S. eastwoodiae*), Narrow-leaved (*S. exigua*), Geyer's (*S. geveryana*), Jepson's (*S. jepsonii*), Arroyo (*S. lasiolepis*), Lemmon's (*S. lemmonii*), Strapleaf (*S. ligulifolia*), Shining (*S. lucida*), Dusky (*S. melanopsis*), Sierra (*S. orestera*), Mackenzie's (*S. prolixa*), Snow (*S. reticulata*), or Scouler's (*S. scouleriana*) Willows. Many of these sites are adjacent to, or include small quantities of Quaking Aspen (*Populus tremuloides*), White Alder (*Alnus rhombifolia*) and other riparian species.

HERBACEOUS

AC

ALPINE MIXED GRASSES AND FORBS ALLIANCE

Prostrate or low-growing perennials and graminoids form the major vegetation components in alpine areas of this type. There are generally less woody species present in this Alliance than in the Mixed Alpine Scrub Alliance. This type has been mapped occasionally at elevations above about 7800 ft (2380 m) in four subsections. Due to high evaporative potential, the short growing season and abrasion or desiccation by wind, morphological adaptations by particular species are often similar to those in the desert. For example, several cushion-forming plants occur within these rocky sites, as well as species with basal rosette-type leaves. On dry, open fell-fields, Phlox (*Phlox covillei*) often dominates a site. On granite and metamorphic, Oval-leaved Buckwheat (*Eriogonum ovalifolium*) is a prominent species in many areas. When parent material is dominated by marble, Cymopterus (*Cymopterus cinerarius*) may be of major importance along with Phlox on some sites. Local conditions and seed sources contribute heavily to plant

diversity in these high elevation areas, such as the occurrence of herbaceous species, including Pussytoes (*Antennaria media*), graminoids such as Sedge (*Carex exerta*), Bluegrass (*Poa* spp.), and Ryegrass (*Elymus* spp.). Other species that may be identified in this Alliance include Prostrate Sibbaldia (*Sibbaldia procumbens*), Knotweed (*Polygonum davisiae*) at lower elevations, Eschscholtz Buttercup (*Ranunculus eschscholtzii*), Rockcress (*Arabis lemmonii*), Mountain Sorrel (*Oxyria digyna*), Pussypaws (*Calyptidium umbellatum*), Indian Paintbrush (*Castilleja lemmonii*) on moist sites, Columbine (*Aquilegia pubescens*), Payson's Draba (*Draba paysonii*), Jacob's Ladder (*Polemonium pulcherrimum*) and Heart Willowweed (*Epilobium obcordatum*). Subshrubs such as Davidson's Penstemon (*Penstemon davidsonii*) may also be found here. This alpine type is often in open sites surrounded by subalpine and upper montane conifers such as Whitebark Pine (*Pinus albicaulis*) and Western White Pine (*P. monticola*). Low Sagebrush (*Artemisia arbuscula*) may be present on these sites or in the vicinity.

HG

ANNUAL GRASSES AND FORBS ALLIANCE

The Annual Grasses and Forbs Alliance occurs frequently on privately and publically owned lands throughout this zone, having been mapped extensively in seven subsections and less frequently in nine others at elevations up to about 10,000 ft (3050 m). These grasslands are dominated by Cheatgrass (*Bromus tectorum*) and other non-natives, often occurring as a direct result of fire or over-grazing within Eastside Pine or Mixed Conifer-Fir Alliance sites, or Sagebrush (*Artemisia* spp.) areas.

HJ

WET MEADOWS (WET GRASSES AND FORBS) ALLIANCE

The Wet Meadows Alliance occurs on aquatic soils of level or gently sloping areas. These sites have permanent water sources and occur on both eastside and westside areas of this zone. They have been identified in scattered and sometimes patchy sites within fourteen subsections at elevations up to about 9200 ft (2806 m). The alliance also occurs adjacent to streams, meadows, lakes, and occasionally as an understory to Red Fir (*Abies magnifica*) or Lodgepole Pine (*Pinus contorta* ssp. *murrayana*) in wet swales. Dominant species are Sedges (*Carex* spp.) and Rushes (*Juncus* spp.) as well as water tolerant grass and forb species.

HM

PERENNIAL GRASSES AND FORBS ALLIANCE

Perennial grasslands have been mapped sparsely in fourteen subsections of this zone at elevations between about 2000 – 9400 ft (610 – 2867 m). This type is a form of dry to moist grassland in which it is difficult to determine species composition without detailed onsite surveys. Some of these areas are currently being used for livestock pasture and are a mix of perennial and annual grasses and legumes that vary according to management practices. Perennial bunchgrasses introduced from Eurasia such as Desert, Tall, and Intermediate Wheatgrasses (*Agropyron desertorum*, *Elytrigia pontica*, *Elytrigia intermedia*), in addition to Tall Fescue (*Festuca arundinacea*), Clover (*Trifolium* spp.), Needlegrass (*Achnatherum* spp.), Squirreltail (*Elymus elymoides*), Rock Cress (*Arabis* spp.), Monardella (*Monardella* spp.), Buckwheat (*Eriogonum* spp.), Cheatgrass (*Bromus tectorum*) and others generally found in northern California may be included in the mixture. Mules-ears (*Wyethia mollis*) are a typical associate towards the east. This Alliance is often associated with moist openings in Red Fir (*Abies magnifica*) forests.

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*, *T. domingensis*, *T. angustifolia*). These small areas have been identified very sparsely in the Upper Foothills Metamorphic Belt Subsection on the westside at an elevation of around 2000 ft (610 m). They are permanently flooded, usually accumulate deep, peaty soils and may occur around the margins of lakes and

springs. Other commonly associated species are Sedges (Carex spp.) and Rushes (Juncus spp.) as well as water tolerant grasses and forbs.

NON-NATIVE VEGETATION

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), Scotch Pine (Pinus sylvestris), etc. Other non-native hardwoods, shrubs and grasses may be associated in minor amounts. Mapped areas of this Alliance are usually in developed areas, including urban and residential landscapes, parks, recreational areas, highways, cemeteries, etc.

IG

NON-NATIVE/ORNAMENTAL GRASS ALLIANCE

Ornamental or non-native grass species define this Alliance, some of which may become invasive weeds. 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 Alliance. Mapped areas of this Alliance are usually in developed areas, including urban and residential landscapes, parks, recreational areas, highways, cemeteries, etc.

IS

NON-NATIVE/ORNAMENTAL SHRUB ALLIANCE

Ornamental or non-native shrub species dominate this Alliance, occasionally becoming invasive, such as Himalayan Blackberry (Rubus discolor). Other non-native conifers, hardwoods, and grasses may be present in this Alliance. Mapped areas of this Alliance are usually in developed areas, including urban and residential landscapes, parks, recreational areas, highways, cemeteries, etc.

LAND USE AND NON-VEGETATED CLASSES

A1

CONIFER AGRICULTURE

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

A2

VINEYARD – SHRUB AGRICULTURE

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

A3

TILLED EARTH AGRICULTURE

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

A4

ORCHARD AGRICULTURE

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

A5

FLOODED ROW CROP AGRICULTURE

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

A6

GRAIN AND CROP AGRICULTURE

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

A7

AGRICULTURE PONDS / WATER FEATURES

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

A8

AGRICULTURAL NURSERIES (GENERAL)

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

AG

AGRICULTURE

Agricultural land is used primarily for the production of food and fiber. High-altitude imagery indicates agricultural activity by distinctive geometric field and road patterns on the landscape and traces produced by mechanized equipment. Agricultural land uses include forest landscapes such as orchards as well as non-forested land uses such as vineyards and field crops. Land used exclusively for livestock pasture may, however, be mapped as Annual Grassland in those cases in which land uses are not recognizable. This type has been mapped at low to moderate elevations within several subsections of this zone and is used as a general land-use category.

BA

BARREN

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

SN

SNOW/ICE

Permanent or long-term snow and ice fields may be found on the tallest peaks of the Sierra Nevada mountains. Snow/Ice may be mapped in areas that are typically barren in drier years but were covered in snow or ice at the time of mapping imagery acquisition, such as lower elevations on north-facing or shaded slopes. In this zone, it has been identified in three subsections at elevations above about 7600 ft (2318 m).

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 size, bays and estuaries and similar water bodies. These areas are considered to have a minimum of rooted 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.)