Vegetation Descriptions

NORTH INTERIOR ECOLOGICAL PROVINCE

CALVEG ZONE 2

December 15, 2008

This zone includes the Southern Cascades Section (M261D) or "Cascades" and the Modoc Plateau Section (M261G) or "Modoc"

CONIFER FOREST / WOODLAND

DF
PACIFIC DOUGLAS FIR ALLIANCE

Pacific Douglas-Fir (Pseudotsuga menziesii) occurring in pure stands is very limited in this zone but has been mapped sparsely in the Cascades Section at elevations below about 5000 ft (1524 m). Douglas-Fir sites are more often mixed with Ponderosa Pine (Pinus ponderosa) in this region. This Alliance tends to occur on mesic soils, primarily on north-facing slopes in the southwestern part of the project area, and adjacent to drainages. The elevational band is below the Mixed Conifer – Pine Alliance. California Black Oak (Quercus kelloggii) is the principal hardwood on these sites, although other oaks may occur in the understory.

DP
DOUGLAS-FIR - PINE ALLIANCE

Within this zone, a mixture of Pacific Douglas-Fir (Pseudotsuga menziesii) and Ponderosa Pine (Pinus ponderosa) may occur together as co-dominant conifers at elevations below about 5600 ft (1708 m). This mixture has been identified very sparsely in western areas of the Hat Creek Rim and High Cascades Subsections and scattered units of the Old Cascades Subsection of the Cascades Section. Oregon Live Oak (Quercus garryana) is often associated with these two conifers. This Alliance intergrades with the Mixed Conifer – Pine, Ponderosa Pine and Pacific Douglas-Fir types.

DW
DOUGLAS-FIR - WHITE FIR ALLIANCE

Douglas-Fir (Pseudotsuga menziesii) and White Fir (Abies concolor) mixtures dominated by those two conifers rarely are found in this area but, this Alliance has been mapped very sparsely in both the Modoc and Cascades Sections, generally at elevations of less than 5800 ft (1768 m). In eastern areas, the Eastside Pine Alliance is found in close proximity to these sites, but in the west, the Douglas-Fir – Pine and Mixed Conifer – Pine Alliances are adjacent to it.

EP
EASTSIDE PINE ALLIANCE

The Eastside Pine Alliance is dominated by Ponderosa Pine (Pinus ponderosa) or occasionally by Jeffrey Pine (P. jeffreyi). It is the most common native plant alliance in the Cascades Section and also is very commonly seen in the Modoc Section, being mapped in the elevation range of aproximately 3000 – 7000 ft (915-2196 m). This Alliance blends into the Western Juniper, Yellow Pine – Western Juniper and Low Sagebrush Alliances in the drier and lower elevational sites of the east. As moisture increases at higher elevations, and on cooler, more north facing slopes, it intergrades with the Mixed Conifer (Pine and Fir) Alliances in the west. Bitterbrush (Purshia tridentata) with or without Big Sagebrush (Artemisia tridentata) forms an almost continuous shrub canopy under open Eastside Pine stands in the Cascades Section.

Perennial forbs such as Woolly Mules-ears (Wyethia mollis) and Balsamroot (Balsamorhiza spp.) may be found on the moister sites in this Alliance.

JJ
YELLOW PINE – WESTERN JUNIPER ALLIANCE

Western Juniper (Juniperus occidentalis var. occidentalis), a small, shade-intolerant, long-lived conifer, is expanding its range in mesic areas in this zone, especially in the absence of recent stand-replacing fires and under heavy livestock grazing conditions. This alliance is defined by combinations of Western Juniper with either or both Ponderosa and/or Jeffrey Pine (Pinus ponderosa, P. jeffreyi), no single conifer species becoming overly dominant. Ponderosa Pine is the typical associate, but Jeffrey Pine is more likely to occur on cooler, higher or steeper slopes. This dynamic pattern indicates the potential loss of more desirable understory shrubs and forbs that might affect wildlife such as the Sage Grouse (Centrocercus urophasianus) within the so-called Sagebrush Steppe Ecosystem. Increasing density of Western Juniper as young shrubby trees develops a Juniper woodland that limits the growth of Sagebrushes (Artemisia spp.) and associated shrubs, grasses and forbs. Quaking Aspen (Populus tremuloides) stands are also in decline and are being invaded by Western Juniper in northeastern areas due to a combination of factors today. The Yellow Pine – Western Juniper Alliance has been identified abundantly in thirteen of sixteen subsections of the Modoc Section and commonly in the Medicine Lake Lava Flows Subsection and five other subsections of the Cascades Section. Elevations are generally in the range of 4000 – 7000 ft (1220 – 2135 m). Low, Mountain and Big Basin Sagebrushes (Artemisia arbuscula, A. tridentata ssp. vaseyana, A. t. ssp. tridentata) are associated with this alliance with the addition of Bitterbrush (Purshia tridentata) in the Cascades Section and occasionally also with California Black Oak (Quercus kelloggii).

JP
JEFFREY PINE ALLIANCE

Jeffrey Pine (Pinus jeffreyi) as a dominant conifer of this alliance occasionally occurs in the absence of Great Basin understory species in the Cascades and Modoc Sections under sites harsher than those supporting dominant Ponderosa Pine (P. ponderosa). These may include those having cooler, higher, steeper slopes or those with shallower soils. This type has been mapped abundantly in the Lassen – Almanor (Cascades) and Bald Mountain – Dixie Valley (Modoc) Subsections and scattered in twelve other subsections of this zone. Greenleaf Manzanita (Arctostaphylos patula) is a strong shrub associate on these sites and others such as Mahala Mat (Ceanothus prostratus), Utah Serviceberry (Amelanchier utahensis), Western Chokecherry (Prunus virginiana) and Woolly Mules-ears (Wyethia mollis) may often occur as well.

KP
KNOBCONE PINE ALLIANCE

Knobcone Pine (Pinus attentuata) occasionally forms pure and often even-aged dense stands in scattered and often burned areas of low to moderate elevations of the Cascades Section. This type has also been mapped in one location at the western edges of the Modoc Section. The Alliance is less common in this region than in areas of northwestern California, it is usually found below 6000 ft (1830 m) and may occur on lava flows in eastern Shasta and Lassen Counties. Common associates include White Fir (Abies concolor) and Ponderosa Pine (P. ponderosa) along with chaparral shrubs such as Greenleaf Manzanita (Arctostaphylos patula), Mountain Whitethorn (Ceanothus cordulatus) and Curlleaf Mountain Mahogany (Cercocarpus ledifolius).

LP
LODGEPOLE PINE ALLIANCE

Dense stands of widely scattered Lodgepole Pine (Pinus contorta ssp. murrayana) have been mapped in ten subsections of the Cascades Section and abundantly in the Warner Mountains Subsection (Modoc Section) at elevations above about 5000 ft (1524 m). This pine is often confined to gentle slopes in areas of water-logged soils or high water tables such as near meadows. It will also occur in basin sites that permit cold-air

pockets to accumulate as well as in drier areas with shallow soils or those having a relatively recent ground disturbance activity. Lodgepole Pine often associates with Red Fir (Abies magnifica var. magnifica and var. shastensis) and other conifers in the Subalpine Alliance such as Mountain Hemlock (Tsuga mertensiana), Whitebark Pine (P. albicaulis) and Western White Pine (P. monticola) at its upper limits and White Fir (A. concolor) at its lower elevations. Western Serviceberry (Amelanchier pallida) may occasionally be found in forest openings. Quaking Aspen (Populus tremuloides), Sagebrushes (Artemisia spp.) and Willows (Salix spp.) are occasionally found on these sites.

MD
INCENSE CEDAR ALLIANCE

Incense Cedar (Calocedrus decurrens), a wide-ranging species that competes well on a variety of sites, has been mapped very sparsely as a dominant conifer in the Horsehead Mountain and Warner Mountains Subsections of the Modoc Section at elevations between about 5200 – 6200 ft (1586 – 1980 m). These stands are adjacent to Ponderosa Pine (Pinus ponderosa), Western Juniper (Juniperus occidentalis var. occidentalis), White Fir (Abies concolor) and Mountain Sagebrush (Artemisia tridentata ssp. vaseyana) Alliances.

MF
MIXED CONIFER - FIR ALLIANCE

This mid-elevation Alliance has been mapped extensively in nine subsections of the Cascades Section, abundantly in the Warner Mountains and Horsehead Mountain Subsections and occasionally in seven others of the Modoc Section at elevation ranging from about 4000 – 9000 ft (1220 – 2745 m). White Fir (Abies concolor) and Lodgepole Pine (Pinus contorta var. murrayana) are important conifers in this mixture in both Sections with Red Fir (A. magnifica) becoming significant at higher elevations and Jeffreyi Pine (P. jeffreyi) of greater importance at lower elevations in the Cascades Section. Stands of Washoe Pine (P. washoensis) mixed with White Fir, Western White Pine (P. monticola) and Lodgepole Pine occur at higher elevations in the Warner Mountains (Modoc Section). Few if any hardwoods occur in the Modoc Section but Black Oak (Quercus kelloggii) and less often, Quaking Aspen (Populus tremuloides) and Canyon Live Oak (Q. chrysolepis) are often found as understory hardwoods in the Cascades Section in this type. The typically sparse understory includes shade tolerant species such as Snowberry (Symphoricarpos spp.), Utah Serviceberry (Amelanchier utahensis), Gooseberry or Currant (Ribes spp.), Mahala Mat (Ceanothus prostratus), and Cherry (Prunus spp.). Bush Chinquapin (Chrysolepis sempervirens), Greenleaf Manzanita (Arctostaphylos patula), Pinemat Manzanita (A. nevadensis) and Snowbrush (Ceanothus velutinus) are often found on more open or disturbed sites in this Alliance and may dominate the vegetation composition until the tree canopy closes. The understory herbaceous component may include graminoids such as Sedges (Carex spp.), Western Needlegrass (Achnatherum occidentalis), Blue Wildrye (Elymus glaucus) and Squirreltail (Elymus elymoides), in addition to forbs such as species of Penstemon and species of Monardella. In mositer sites towards the west, Wintergreen (Pyrola spp.), and Little Princes Pine (Chimaphila menziesii) may also occur.

MH
MOUNTAIN HEMLOCK ALLIANCE

Mountain Hemlock (Tsuga mertensiana) dominates small subalpine areas and those at or just below timberline in some areas of the Cascades Section such as on Lassen Peak and Lassen – Almanor Subsections and higher north slopes of the Medicine Lake Highland and High Cascades Subsections. This Alliance is occasionally found on cold, moist slopes above about 6600 ft (2012 m). Conifers such as Red Fir (Abies magnifica), Western White Pine (Pinus monticola), Whitebark Pine (P. albicaulis), and an occasional Lodgepole Pine (P. contorta ssp. murrayana) may also be present in minor amounts on these sites. The soils are typically an unconsolidated pumice or volcanic ash. Although these stands are somewhat open, the harsh conditions limit the understory species, which may include the prostrate Pinemat Manzanita (Arctostaphylos nevadensis).

MN
MCNAB CYPRESS ALLIANCE

McNab Cypress (Cupressus or Callitropsis macnabiana) as a dominant conifer, although rare in this zone, has been identified sparsely on low - elevation ridgetops in harsh, rocky areas, especially those underlain by ultramafic and gabbro strata, or scattered among woodlands at lower elevations in relict stands north of its main areas of concentration. These conditions occur in a small southwestern corner of the Shingletown – Paradise Subsection (Cascades Section) at elevations between about 2200 – 2400 ft (671 – 732 m).

MO
BAKER (MODOC) CYPRESS ALLIANCE

The major site of this Alliance is in the southwest corner of Modoc County. It is occupied by Baker Cypress (Cupressus or Callitropsis bakeri), occurring on recent lava flows and basalt as brush fields from 3500 - 4000 ft (1068m - 1220m). It is an uncommon geographical associate of the Mixed Conifer - Pine Alliance and has not yet been mapped in the North Interior Calveg zone. Associated species may include Western Juniper (Juniperus occidentalis), Ponderosa Pine (Pinus ponderosa), and Big Sagebrush (Artemisia tridentata).

MP
MIXED CONIFER - PINE ALLIANCE

The Mixed Conifer – Pine Alliance is a low- to mid-elevation conifer mixture with varying densities of Ponderosa and/or Sugar Pines (Pinus ponderosa, P. lambertiana), Pacific Douglas-Fir (Pseudotsuga menziesii) and White Fir (Abies concolor) in the west, and Ponderosa Pine, White Fir and Western Juniper (Juniperus occidentalis) in the east and others such as Incense Cedar (Calocedrus decurrens). This alliance has been mapped extensively in twelve subsections of the Cascades Section, abundantly in five subsections of the Modoc Section and in two others. The elevation range is from about 1400 – 7000 ft (427 – 2135 m). Associated hardwoods are scarce in the Modoc Section, generally being limited to California Black Oak (Quercus kelloggii) understories. Hardwood associates in the Cascades section include Oregon White Oak (Q. garryana) and occasional Canyon Live Oaks (Q. chrysolepis) in addition to the more prevalent California Black Oak on these sites. Shrub associates in more open stands tend to be those in the Upper Montane Mixed Chaparral Alliance such as Greenleaf Manzanita (Arctostaphylos patula) with the addition of Mountain Sagebrush (Artemisia tridentata ssp. vaseyana) in the east and Bitterbrush (Purshia tridentata) in the west.

MU
ULTRAMAFIC MIXED CONIFER ALLIANCE

Ultramafic and serpentinized areas rarely occur in this zone. The lithology on these sites affect the abundance and distribution of vegetation similar to the situation further west in the North Coast and Montane Calveg zone. This Alliance has been identified in the extreme southwestern sector of the Upper Shasta Valley Subsection (Cascades Section) on Trinity peridotite just east of one of the main Alliance occurrences in the Upper Scott Mountains of the Klamath Mountains Section. It contains a mixture of upper elevation conifers such as Lodgepole Pine (Pinus contorta ssp. murrayana), Western White Pine (P. monticola) and Jeffrey Pine (P. jeffreyi) occurring at much lower altitudes in this Alliance due to edaphic conditions. Elevation in this area is in the range of about 3400 – 5000 ft (1036 – 1526 m). McNab Cypress (Cupressus or Callitropsis macnabiana) may also be present.

PD
GRAY PINE ALLIANCE

This open conifer Alliance is primarily found in the low-elevation foothills, front country and steep, drier canyons, generally below about 4000 ft (1220 m). It has been identified in scattered areas of the Hat Creek Rim and Shingletown - Paradise Subsections in the Cascades Section. The sparsely-leaved Gray Pine (Pinus sabiniana) is usually the only conifer in this Alliance, but the sites are typically diverse in structure. Hardwoods such as Canyon Live Oak (Quercus chrysolepis), Oregon White Oak (Q. garryana), and Blue

Oak (Q. douglasii) often occur on these sites as well as low-elevation chaparral shrubs such as Wedgeleaf Ceanothus (Ceanothus cuneatus) and Whiteleaf and Common Manzanitas (Arctostaphylos viscida, A. manzanita). Ponderosa Pine (P. ponderosa) stands are often adjacent to Gray Pine sites.

PE
SUGAR PINE ALLIANCE

Sugar Pine (Pinus lambertiana), more frequently seen as a component of Mixed Conifer – Pine sites, is rarely found in pure stands in most Calveg zones. Small scattered stands of Sugar Pine, however, have been mapped towards the southeastern border of the Medicine Lake Highlands Subsection (Cascade Section) on north-facing volcanic soils at elevations of about 4800 – 6200 ft (1464 – 1890 m). Conifer associates on these sites include both Ponderosa and Lodgepole Pines (P. ponderosa, P. contorta ssp. murrayana) and the shrub Greenleaf Manzanita (Arctostaphylos patula).

PP
PONDEROSA PINE ALLIANCE

Pure to nearly pure Ponderosa Pine (Pinus ponderosa) stands occur in a wide elevational band from about 1000 – 7000 ft (305 – 2135 m) in this zone. Black Oak (Quercus kelloggii) is the most prevalent hardwood associated with these stands but, Canyon Live Oak (Q. chrysolepis) and Oregon White Oak (Q. garryana) occur less commonly in the Cascades Section. The pine may become the dominant conifer on well-drained, often droughty, non-serpentinized soils such as coarse-textured alluvial sites and southwest-facing or steep slopes. This alliance develops into the Mixed Conifer – Pine type under more favorable or mesic site conditions with the addition of White Fir (Abies concolor) and other conifers. It is very abundant in the McCloud Flat and Shingletown – Paradise (Cascade) and Mowitz Buttes (Modoc) Subsections, occurring less frequently in fifteen others. Associated shrubs are those in both lower and upper montane sites such as Wedgeleaf Ceanothus (C. cuneatus), Greenleaf Manzanita (Arctostaphylos patula), Utah Serviceberry (Amelanchier utahensis) and Western Chokecherry (Prunus virginiana). As Great Basin elements such as Mountain Sagebrush (Artemisia tridentata ssp. vaseyana) become more significant in the understory, the Ponderosa Pine Alliance is identified as the Eastside Pine Alliance.

PW
PONDEROSA PINE - WHITE FIR ALLIANCE

Mixtures of Ponderosa Pine (Pinus ponderosa) and White Fir (Abies concolor) occur prominently in certain areas of this zone. This Alliance has been mapped occasionally in six subsections of the Modoc Section, abundantly in the McCloud Flat, Medicine Lake Highlands and High Cascades Subsections of the Cascade Section, and also in five other subsections. The Alliance is found on sites between about 3800 – 7000 ft (1158 – 2135 m). In many cases, Ponderosa Pine is dominant in the overstory of these stands but White Fir may be increasing in importance due to a complexity of factors that include fire history, microsite and edaphic conditions, moisture availability, logging residuals and the like. Depending on these factors and stand openness, the understory shrubs in this alliance can be highly variable. Common associates may include Mountain Sagebrush (Artemisia tridentata ssp. vaseyana), Mahala Mat (Ceanothus prostratus), Mountain Snowberry (Symphoricarpos rotundifolius), Western Serviceberry (Amelanchier pallida), Wax Currant (Ribes cereum), Bitterbrush (Purshia tridentata), Curlleaf Mountain Mahogany (Cercocarpus ledifolius), Oregon Grape (Berberis aquifolium), Bloomer Goldenbush (Ericameria bloomeri), Greenleaf Manzanita (Arctostaphylos patula), Snowbrush (Ceanothus velutinus), Bitter Cherry (Prunus emarginata), Western Chokecherry (P. virginiana), etc.

RF
RED FIR ALLIANCE

Shasta Red Fir (Abies magnifica var. shastensis) dominates high elevation forests in the Cascades Section from about 5500 - 8600 feet (1687 -2623 m), although it is absent from or very limited in the Modoc Plateau Section. It occurs abundantly in areas of Lassen Peak (Lassen - Almanor Subsection), Mt. Shasta and high elevations to the north (High Cascade Subsection) and in the Medicine Lake Highlands

Subsection. Lodgepole Pine (Pinus contorta ssp. murrayana) is a common conifer associate at lower elevations, and subalpine conifers such as Mountain Hemlock (Tsuga mertensiana), Western White Pine (P. monticola), and Whitebark Pine (P. albicaulis) are found as inclusions on some ridge tops, such as in the Lassen Peak area. In some areas, such as around Mt. Shasta and in Medicine Lakes, Red Fir and White Fir (Abies concolor) commonly occur together in this Alliance. Shrubs and herbaceous plants are sparse under the typically dense growth of Red Fir. Common understory associates, however, may include the shrubs Pinemat Manzanita (Arctostaphylos nevadensis) and, at lower sites, Greenleaf Manzanita (Arctostaphylos patula), Snowbrush (Ceanothus velutinus), Bush Chinquapin (Chrysolepis sempervirens), Scouler's Willow (Salix scouleriana), and Snowberry (Symphoricarpos spp.).

SA
SUBALPINE CONIFER ALLIANCE

Small areas of the Cascades Section have a mixture of subalpine conifers at higher elevations, commonly above 6500 ft (1982 m) or just below timberline in the Mt. Shasta area. No single species is dominant. This Alliance has been identified mainly in the High Cascades, Medicine Lake Highlands and Lassen - Almanor Subsections. Various combinations of Red Fir (Abies magnifica var. magnifica and var. shastensis), Western White Pine (Pinus monticola), Lodgepole Pine (P. contorta ssp. murrayana), Mountain Hemlock (Tsuga mertensiana) and Whitebark Pine (P. albicaulis) may be present in this area. Understory shrubs rarely occur.

WB
WHITEBARK PINE ALLIANCE

In this zone, Whitebark Pine (Pinus albicaulis) becomes the primary frostline (upper timberline) conifer of certain exposed, often northerly ridges in the vicinity of 7800 – 9000 ft. (2380 - 2745 m). These areas occur, for example, in Goosenest Mtn., China Mtns., the Eddies, the southern Warner Mountains, the Ball Mountain area, Lassen Peak and on Mt. Shasta. Sites are usually very open and rocky with little vegetation cover. The understory is generally sparse except for a few perennial grasses and forbs, although Bush Chinquapin (Chrysolepis sempervirens) grows in some adjacent rock outcrop sites and Mountain Sagebrush (Artemisia tridentata ssp. tridentata) and Pinemat Manzanita (Arctostaphylos nevadensis) in openings. Red Fir (Abies magnifica) and Quaking Aspen (Populus tremuloides) may occasionally be found at the lower elevations of this type. The Whitebark Pine Alliance grades into the Subalpine Conifer type where greater species diversity exists to include such species as Lodgepole Pine (P. contorta ssp. murrayana) and Western White Pine (P. monticola).

WF
WHITE FIR ALLIANCE

White Fir (Abies concolor) as a dominant conifer has been mapped abundantly in the Warner Mountains and Horsehead Mountain Subsections (Modoc) and the High Cascade, Medicine Lake Highlands and Lassen – Almanor Subsections (Cascades). It occurs occasionally in nine other subsections throughout this zone. Elevations are of the order 4000 – 8000 ft (1220 – 2440 m) in the Cascades Section and 5200 - 8000 ft (1586 - 2440 m) in the Modoc Section. Slopes may be gentle or steep, and the aspects are often northerly where this species forms almost pure stands. Logging of Ponderosa Pine and fire exclusion policies have contributed to the White Fir dominance on many of these sites. Many areas have some evidence of injury to White Fir where the fir engraver beetle is the primary agent. Other conifer species which may be present in minor amounts include Incense Cedar (Calocedrus decurrens), Ponderosa Pine (Pinus ponderosa), Lodgepole Pine (P. contorta ssp. murrayana) and Red Fir (A. magnifica). Baker Cypress (Cupressus or Callitropsis bakeri) is found scattered within stands of White Fir in a small area near Goosenest Mountain, and may have occupied a much larger area in the past, when fires were more frequent on these sites. Shrub cover in the White Fir Alliance is generally sparse and typically includes shade tolerant species such as Snowberry (Symphoricarpos spp.) and Serviceberry (Amelanchier spp.). Sites within this Alliance may also contain montane chaparral species such as Greenleaf Manzanita (Arctostaphylos patula) and Snowbrush (Ceanothus velutinus) where ground disturbances have occurred. Inclusions of Mountain

Sagebrush (Artemisia tridentata ssp. vaseyana) commonly occur in many areas of the Modoc Section. Herbaceous vegetation is also typically sparse because of high tree densities.

WJ
WESTERN JUNIPER ALLIANCE

Conifer areas in which Western Juniper (Juniperus occidentalis var. occidentalis) is dominant occur as inland or semi-desert environments of moderate elevations (below about 6200 ft or 1890 m) in the Cascades Section and up to about 7400 ft (2256 m) in the Modoc Section. Western Juniper is an invasive species in this zone, encroaching on Ponderosa Pine (Pinus ponderosa), Quaking Aspen (Populus tremuloides), Bitterbrush (Purshia tridentata) and Sagebrush (Artemisia spp.) sites. A complex interaction of climate and disturbance factors such as fire exclusion and livestock presence and grazing are thought to be factors in this conversion process. Old-growth Western Junipers are limited and widely scattered in this area, often restricted to rocky or fuel-limited sites. As the stand canopy closes to above about 45% site cover, many more desirable shrub and herbaceous understory species are eliminated due to shading. Under more open conditions, Medusahead (Taeniatherum caput-medusae), a noxious introduced grass, is more likely to invade clay-rich Western Juniper sites, while the ubiquitous introduced Cheatgrass (Bromus tectorum) is more likely to be introduced through disturbances such as fire in these areas.

WP
WASHOE PINE ALLIANCE

Washoe Pine (Pinus washoensis), a rare upper montane conifer, appears to be taxonomically related to an inland variety of western Ponderosa Pine (North Plateau race: P. ponderosa var. scopulorum) and/or an interior Rocky Mountain race (P. ponderosa var. ponderosa). These well-studied scattered stands occur mainly on Mt. Rose in northwestern Nevada (not mapped in this project) and the Warner Mountains in this area. These mapped sites in the Warner Mountains Subsection (Modoc Section) occur on south to southwest facing slopes at elevations (as mapped) between about 6400 – 7800 ft (1952 – 2379 m). White Fir (Abies concolor) and Lodgepole Pine (P. contorta ssp. murrayana) may occur as minor inclusions in these stands, as past fire exclusions and logging practices in this area encouraged the establishment of White Fir in the overstory. Mountain Snowberry (Symphoricarpos rotundifolius), Bloomer Goldenbush (Ericameria bloomeri) and Mountain Sagebrush (Artemisia tridentata ssp. vaseyana) typically occur in these stands in addition to herbaceous plants such as Sticky Starwort (Pseudostellaria jamesiana), Tower Butterweed (Senecio integerrimus), Ross' Sedge (Carex rossii), Wheeler Bluegrass (Poa wheeleri) and Squirreltail (Elymus elymoides).

WW
WESTERN WHITE PINE ALLIANCE

Western White Pine (Pinus monticola), a widely-ranging conifer that is found in diverse habitats in the Pacific Northwest and northern Rocky Mountains, reaches the northeasternmost limit of its distribution in California in the Warner Mountains Subsection (Modoc Section). It occurs there in scattered stands as a dominant conifer on Tertiary-aged volcanic flows and pyroclastic rocks. In such locations, typical associates of this alliance include White Fir (Abies concolor), Lodgepole Pine (P. contorta ssp. murrayana) and Mountain Sagebrush (Artemisia tridentata ssp. vaseyana). Populations have also been mapped on more recent (Quaternary and Holocene-aged) volcanic flow areas in the Medicine Lakes Highlands and High Cascade Subsections (Cascade Section) such as in the vicinity of the Glass Mountain lava extrusions. Typical associates in that section include Red Fir (A. magnifica), Lodgepole Pine, Mountain Hemlock (Tsuga mertensiana) and Whitebark Pine (P. albicaulis). The alliance has been mapped in upper montane and subalpine elevations from about 6000 – 8600 ft (1830 – 2623 m).

HARDWOOD FOREST / WOODLAND

FM
CURLLEAF MOUNTAIN MAHOGANY ALLIANCE

The single-stemmed form of Curlleaf Mountain Mahogany (Cercocarpus ledifolius var. intermontanus) occurs as a dominant hardwood on gently to steeply sloping mountain uplands and ridge tops, usually in association with rocky outcrops. These sites are very sparsely mapped in the Modoc and Cascade Sections at elevations between about 4800 – 6400 ft (1464 – 1952 m). This species may be associated with conifers such as Western Juniper (Juniperus occidentalis var. occidentalis), Ponderosa Pine (Pinus ponderosa) and Jeffrey Pine (P. jeffreyi) and with shrubs such as Mountain Sagebrush (Artemisia tridentata ssp. vaseyana) and grasses such as Idaho Fescue (Festuca idahoensis) and Squirreltail (Elymus elymoides)..

NR
RIPARIAN MIXED HARDWOOD ALLIANCE

Along rivers and streams, a mixture of riparian hardwood species may occur where no clearly dominant species exists. The Riparian Mixed Hardwood Alliance has been mapped sparsely in widely scattered areas of the Warner Mountains and Adin Mountains and Valleys Subsections (Modoc Section) and occasionally in seven other subsections of the Cascade Section within an elevation range of about 2000 – 5400 ft (610 – 1646 m). Combinations of Quaking Aspen (Populus tremuloides), tree Willow (Salix spp.), and Black Cottonwood (Populus balsamifera spp. trichocarpa) are sometimes found adjacent to these sites.

NX
INTERIOR MIXED HARDWOOD ALLIANCE

Several species of hardwoods occur together in stands with no clearly dominant species in this zone identified as the Interior Mixed Hardwood Alliance. These areas have been mapped very sparsely only in the Shingletown-Paradise and Old Cascades Subsections (Cascades Section) and at elevations between about 1800 – 3600 ft (548 – 1098 m). The hardwoods mixture includes a significant presence of Blue Oak (Quercus douglasii) or Oregon White Oak (Q. garryana), in combination with minor amounts of Black Oak (Q. kelloggii) and possibly others such as Canyon Live Oak (Q. chrysolepis). This Alliance is adjacent to shrubs of the Lower Montane Mixed Chaparral Alliance such as Wedgeleaf Ceanothus (Ceanothus cuneatus), Whiteleaf Manzanita (Arctostaphylos viscida) and Birchleaf Mountain Mahogany (Cercocarpus betuloides).

QC
CANYON LIVE OAK ALLIANCE

The Canyon Live Oak (Quercus chrysolepis) Alliance generally occurs on steep, colluvial, low elevation slopes or those with shallow soils and associates with California Black Oak (Q. kelloggii) and Ponderosa Pine (Pinus ponderosa). This oak Alliance occurs abundantly in the Shingletown – Paradise Subsection as well as in five others in the Cascades Section within an elevation range of about 1400 – 5800 ft (427 – 1768 m). Low elevation shrubs such as Wedgeleaf Ceanothus (C. cuneatus), Whiteleaf Manzanita (Arctostaphylos viscida) and Birchleaf Mountain Mahogany (Cercocarpus betuloides) commonly occur with this hardwood.

QD
BLUE OAK ALLIANCE

Blue Oak (Quercus douglasii) hardwood savannas occur sparsely in this zone, mainly along western edges of the Cascades Section (Shingletown - Paradise Subsection) where it borders the Sierra Nevada Foothills Section in this area. The Alliance is found at low elevations, usually below about 3000 ft (914 m). It intergrades in this area with Ponderosa Pine (Pinus ponderosa) with which it forms a common mixed conifer – hardwood mixture with the Lower Montane Mixed Chaparral Alliance. Scattered Gray Pine (Pinus sabiniana) may also occur within the Blue Oak Alliance, but the pine is not dominant in the canopy.

QE
WHITE ALDER ALLIANCE

Mid-elevation riparian sites of inland northern California may have a clear but relatively short-lived dominance of White Alder (Alnus rhombifolia) in the tree canopy layer, as this species seeds and germinates well after ground disturbing events such as floods. This Alliance is rarely found in this zone and has been identified only in the Lassen - Almanor Subsection of the Cascades Section within an elevation range of about 4400 – 7200 ft (1342 – 2196 m). Facultative riparian species such as Bigleaf Maple (Acer macrophyllum) and Mountain Dogwood (Cornus nuttallii) may occur as minor components of this alliance.

QG
OREGON WHITE OAK ALLIANCE

This Alliance, dominated by arboreal forms of Oregon White Oak (Quercus garryana), occurs on gentle slopes and often shallow, flooded, droughty, clay-rich, or otherwise less productive soils in the Cascades Section. Although moderately shade-tolerant, the oak may succumb to shading by other species. This alliance has been mapped abundantly in its tree form (var. garryana) in scattered stands in the Klamath River watershed (Parker Mountain Flats and Old Cascades Subsections) and Pit River Watershed (Hat Creek Rim Subsections). Oregon White Oak occurs from Shasta Lake to southwestern Modoc County in this zone, occurring less commonly towards the east. It has been identified in several scattered stands in the Big Valley Mountains, Fall River Valley and other subsections of the Modoc Section. The mapped elevation range of this alliance is from about 2200 – 4800 ft (671 – 1464 m), although Oregon White Oak may occur above 5000 ft (1524 m) as understory to Eastside Pine and Mixed Conifer – Pine conifer stands. Common associates in this alliance include Ponderosa Pine (Pinus ponderosa), annual grasses and forbs, and low elevation chaparral types such as Wedgeleaf Ceanothus (C. cuneatus). A mixture of Oregon White Oak, Ponderosa Pine, and Western Juniper (Juniperus occidentalis) is sometimes found on volcanic substrates towards the northeastern areas of the Modoc Section at elevations below about 4500 ft (1372 m). Understory associates in this area include Sierra Plum (Prunus subcordata), Chokecherry (Prunus virginiata), Bitter Cherry (P. emarginata), Gooseberry (Ribes spp.), Squirreltail (Elymus elymoides), Blue Wildrye (Elymus glaucus), and a variety of forbs.

QJ
COTTONWOOD - ALDER ALLIANCE

Low to moderate elevation riparian areas are sometimes dominated by both Black Cottonwood (Populus balsamifera ssp. trichocarpa) and White Alder (Alnus rhombifolia) in this zone. In higher elevation riparian areas, Black Cottonwood is associated with Mountain Alder (Alnus incana ssp. tenuifolia). These hardwoods, any of which may become locally dominant, occur adjacent to streams, perennial seeps, and meadows. Oregon Ash (Fraxinus latifolia), Willows (Salix spp.), and a high diversity of forbs are common associates. This Alliance occurs sparsely in the Cascades Section (Lassen - Almanor and Shingletown - Paradise Subsections).

QK
BLACK OAK ALLIANCE

California Black Oak (Quercus kelloggii), widely distributed over most areas of California and elsewhere, occurs as a dominant species in its own alliance extensively in this zone. This alliance has been mapped abundantly in the Shingletown – Paradise and Hat Creek Rim Subsections and six others of the Cascades Section, and commonly occurs in the Big Valley Mountains and eight others of the Modoc Section, although it is apparently absent from the Warner Mountains Subsection. Elevations range from about 1400 – 6200 ft (427 – 1890 m). Black Oak can occur in pure stands in forest openings associated with a variety of edaphic conditions and with conifers such as Ponderosa Pine (Pinus ponderosa), White Fir (Abies concolor), Douglas-Fir (Pseudotsuga menziesii), and Western Juniper (Juniperus occidentalis). As the interior sections become increasingly more xeric with distance away from the coast, Black Oak may

occasionally be found near but usually not within riparian channels or on steeper slopes, sometimes associating with Western Juniper (Juniperus occidentalis) in these areas.

QM
BIGLEAF MAPLE ALLIANCE

Pockets of Bigleaf Maple (Acer macrophyllum) occasionally occur in this zone, such as in western sectors of the Hat Creek Rim Subsection of the Cascades Section. However, the maple has rarely been mapped as a dominant in its own alliance, as it reaches its northeasternmost distributional limit here. These moist, well shaded and often steeply sloping sites are usually found below about 5000 ft (1525 m). In contrast to obligate hydrophytes such as White Alder (Alnus rhombifolia), Bigleaf Maple does not tolerate long periods of seasonal flooding, nor is it considered to be a pioneer hardwood on such sites. Its maintainance on disturbed sites is partially due to its ability to stump sprout and grow rapidly after being cut. White Alder, Pacific Dogwood (Cornus nuttallii), and California Hazelnut (Corylus cornuta) are usual associates of the Bigleaf Maple Alliance.

QO
WILLOW ALLIANCE

This riparian stringer-like Alliance is defined by tree-sized willows of any species (Salix spp.) in the wettest portion of riparian floodplains or wet meadows of this area. It occurs sparsely but widely in fourteen subsections from the Old Cascades Subsection (Cascades Section) in the northwest to the Eagle Lake – Observation Peak Subsection (Modoc Section). The alliance has been mapped more abundantly, however, in the Big Valley Subsection (Modoc). Elevations range from about 4000 – 6800 ft (1220 – 2074 m). Willows dominate these stream or seepage areas to the exclusion of other riparian species but other species such as Quaking Aspen Populus tremuloides) or the Cottonwoods (Populus spp.) and White Alder (Alnus rhombifolia) may occur in small amounts. The herbaceous layer is primarily Sedges (Carex spp.) and numerous grasses and forbs that occur in adjacent wet meadows bordering these sites. The most common arboreal willows in this general area are Red (S. laevigata), Shining (S. lucida), Arroyo (S. lasiolepis) and Scouler's Willows (S. scouleriana).

QQ
QUAKING ASPEN ALLIANCE

Scattered, relict, clonal stands of Aspen (Populus tremuloides) occur along stream courses and as an indicator of moist conditions on upland sites in this region. Aspen is considered to be very shade-intolerant but grows rapidly by root suckers after disturbance to dominate a site. Aspens in long-enduring clones tend to improve soil moisture and nutrient recycling processes through the incorporation of aspen litter and other factors. Willow (Salix spp.), Mountain Alder (Alnus incana ssp. tenuifolia), and perennial grasses and forbs such as False Hellebore (Veratrum californicum) in the wetter "meadow aspen sites" or Mountain Sagebrush (Artemisia tridentata ssp. vaseyana) in the drier upland sites are common associates. Aspen is a desirable management species for wildlife forage and habitat improvements. It has been mapped abundantly in the Warner Mountains Subsection (Modoc) and more rarely in twelve other subsections of this zone at elevations from about 3400 – 8600 ft (1036 – 2623 m). In open stands, minor amounts of conifers such as Lodgepole Pine (Pinus contorta ssp. murrayana) and White and Red Firs (Abies concolor, A. magnifica) may also be present.

QT
TANOAK ALLIANCE

Tanoak (Lithocarpus densiflorus) can be found east of its coastal distribution in the Cascades Section of this zone, where it nearly reaches its northeasternmost distributional limits. It has been mapped sparsely in the Shingletown – Paradise Subsection at elevations between about 1800 – 2600 ft (548 – 792 m). This Alliance associates with the Douglas-Fir - Pine and Mixed Conifer - Pine Alliances in this area.

QW
INTERIOR LIVE OAK ALLIANCE

Interior Live Oak (Quercus wislizenii) grows in diverse environments but has rarely been mapped as a dominant hardwood in this zone, as it reaches its northeasternmost distribution here. However, this alliance has been mapped occasionally along the western edges of the Shingletown – Paradise Subsection (Cascades Section) at elevations between about 1400 – 3000 ft (427 – 915 m). Its evergreen leaf habit possibly is cited as one of the factors that limits its distribution on higher and colder sites further upslope and to the east. Ponderosa Pine (Pinus ponderosa) is the main tree associate, the two species sometimes forming mixed conifer - hardwood stands within the same areas and general elevation ranges. Interior Live Oak is often seen as a shrub (var. frutescens) within the Scrub Oak or the Lower Montane Mixed Chaparral Alliances in some areas. Scattered Gray Pine (Pinus sabiniana) may also occur within this Alliance.

QX
BLACK COTTONWOOD ALLIANCE

Black Cottonwood (Populus balsamifera ssp. trichocarpa) occurs in certain riparian areas in this zone, but have been mapped only sparsely in both Sections as a dominant hardwood. In the Cascades Section (Lassen – Almanor Subsection), it has been identified only as an understory component with conifers in wet areas, such as Lodgepole Pine (Pinus contorta ssp. murrayana). Black Cottonwood has been mapped in its own hardwood alliance more consistently, although sparsely, in the Modoc Section within four subsections at elevations ranging between about 4200 – 6000 ft (1280 – 1830 m). Associated species are mainly perennial grasses and forbs found in the Wet Meadows Alliance, although upland Eastside shrubs and trees such as Big Sagebrush (Artemisia tridentata), Ponderosa Pine (P. ponderosa) and Western Juniper (Juniperus occidentalis) are often located upslope of and adjacent to these sites.

QY
WILLOW - ALDER ALLIANCE

A mixture of Willows (Salix spp.) and Alders (Alnus spp.), especially White Alder (A. rhombifolia) may share canopy dominance in riparian sites where they occur together in this zone. This Alliance has been identified in scattered areas of the Hat Creek Rim, Shingletown – Paradise and Lassen – Almanor Subsections of the Cascades Section at elevations between about 3200 – 6800 ft (976 – 2074 m). The more common tree willows are Red (S. laevigata), Shining (S. lucida), Arroyo (S. lasiolepis) and Scouler's Willows (S. scouleriana) in this region. Gooseberry or Currant (Ribes spp.), Blackberry (Rubus spp.), Wild Rose (Rosa spp.), and Western Poison Oak (Toxicodendron diversilobum) are common shrub associates in these riparian areas.

TX
MONTANE MIXED HARDWOOD ALLIANCE

This alliance generally occurs on sites favorable to the growth of low to mid-montane conifers such as Ponderosa Pine (Pinus ponderosa) and Douglas-Fir (Pseudotsuga menziesii) and usually above Interior Mixed Hardwood sites. It has been mapped sparsely at elevations between about 2800 – 4400 ft (854 – 1342 m) in widely scattered patches in the Old Cascades and Upper Shasta Valley Subsections (Cascades Section). In this area, the mixture includes any combination of non-dominant but prominent deciduous oaks such as Oregon White Oak (Quercus garryana) and California Black Oak (Q. kelloggii) with possible inclusions of evergreen oaks in minor amounts such as Canyon Live Oak (Q. chrysolepis) and/or Interior Live Oak (Q. wislizenii).

SHRUBS AND CHAPARRAL

AX
ALPINE MIXED SCRUB ALLIANCE

The Alpine Mixed Scrub Alliance contains a mixture of dwarf shrubs which often develop cushion or rosette forms in addition to low graminoid and forb species on exposed subalpine or alpine mountain sites. Species composition varies considerably throughout California. In the Warner Mountains Subsection (Modoc Section), for example, this Alliance may include shrubs such as Spiraea (Holodiscus microphyllus), Greene and Whitestem Goldenbush (Ericameria greenei, E. discoidea), and Mountain White Heather (Cassiope mertensiana). Herbaceous and graminioid species such as Rock Cress (Arabis spp.), Pussy Paws (Calyptridium umbellatum), and Squirreltail (Elymus elymoides) may also be present. This type has been mapped sparsely in the higher mountains of the Cascades and Modoc Sections at elevations above about 7000 ft (2135 m). In the west, these sites are often within or adjacent to Red Fir (Abies magnifica), Whitebark Pine (Pinus albicaulis) and Pinemat Manzanita (Arctostaphylos nevadensis) in open areas. The Great Basin climate in the Warner Mountains influences the distribution of species in this alliance and its adjacency to Low Sagebrush (Artemisia arbuscula), Mountain Sagebrush (A. tridentata ssp. vaseyana) and Lodgepole Pine (P. contorta ssp. murrayana) sites.

BB
BITTERBRUSH ALLIANCE

This Alliance is characterized by almost pure stands of Bitterbrush (Purshia tridentata), often within the same elevations and soils as the Eastside Pine and Western Juniper Alliances. It has been mapped frequently in the Cascades and Modoc Sections at elevations within the general range 3000 – 6200 ft (915 – 1890 m). The abundance of Bitterbrush is relative to the canopy closure of the associated conifers, Ponderosa Pine (Pinus ponderosa) or Jeffrey Pine (P. jeffreyi) and Western Juniper (Juniperus occidentalis). Bitterbrush forms an almost continuous shrub canopy at low forest densities, is usually absent in pine thickets and may occur on lower elevation sites where precipitation is low and pine regeneration is poor. The dominant graminoids of the Bitterbrush Alliance include Idaho Fescue (Festuca idahoensis), Squirreltail (Elymus elymoides), Ross' Sedge (Carex rossii), and Cheatgrass (Bromus tectorum). Annual forbs are also common. Other shrub associates include Big Sagebrush (Artemisia tridentata), Low Sagebrush (A. arbuscula), Wax Currant (Ribes cereum), and Mahala Mat (Ceanothus prostratus), some of which may grow well on disturbed sites, pparticularly at lower elevations. On very disturbed sites, Rabbitbrush and Cheatgrass may replace Bitterbrush.

BG
GREASEWOOD ALLIANCE

Although Greasewood (Sarcobatus vermiculatus) is one of the more important (although hazardous) browse plants in alkaline areas of many western states and provinces, it appears to have restricted occurrence in this zone. It has been mapped very sparsely as a dominant shrub only in the Lower Klamath – Tule Lake Basins Subsection (Modoc Section) and adjoining Medicine Lake Lava Flows Subsection (Cascade Section) at elevations between about 4000 - 4400 ft (1220 - 1342 m) there. Greasewood is also known to occur on alkaline flats near Mount Bidwell (Warner Mountains Subsection of the Modoc Section) and especially in vvernal ponds elsewhere which are shallow to a hardpan and which support very little vegetation.

BL
LOW SAGEBRUSH ALLIANCE

Low Sagebrush (Artemisia arbuscula), a small evergreen shrub, is abundant in this zone, although often restricted to basins with clay and hardpan soils of glacial outwash plains or shallow soils of lava flows. These soils are commonly saturated in the spring and early summer. When in association with the Bitterbrush Alliance, the vegetation reflects a mosaic of shallow and deep soil conditions: Bitterbrush (Purshia tridentata) on deeper and more well drained sites and Low Sagebrush on shallow, harsher sites.

The alliance in which it is the dominant shrub, has been mapped with some frequency in several subsections of the Modoc and Cascade Sections at elevations from about 3400 – 9400 ft (1036 – 2867 m). Other associated shrubs include Buckwheat (Eriogonum spp.) on shallower sites and Big Basin or Mountain Sagebrush (Artemisia tridentata ssp. tridentata, A. t. ssp. vaseyana) and Rabbitbrush (Chrysothamnus spp.) on slightly deeper and more loamy soils. The understory may include grasses such as Idaho Fescue (Festuca idahoensis), One Spike Oatgrass (Danthonia unispicata), Hairgrass (Deschampsia spp.), Junegrass (Koeleria spp.), Sandberg's Bluegrass (Poa incurva), and Squirreltail (Elymus elymoides). Many forbs are associated with this Alliance including a number of hydrophytes in the ponded sites. Oregon Yampah (Perideridia oregana), Lomatium spp., and Wild Onion (Allium spp.) are common herbaceous associates.

BM
MOUNTAIN MAHOGANY ALLIANCE

This Alliance is dominated by Curlleaf Mountain Mahogany (Cercocarpus ledifolius), occurring on rocky outcrops such as scarps, colluvial slopes, and lava ridges in the Modoc and Cascade Sections throughout this zone. Mapped elevations are generally up to about 8600 ft (2623 m). These stands are commonly found as inclusions in the Eastside Pine and Western Juniper Alliances. On more xeric sites, Mountain Sagebrush (Artemisia tridentata ssp. vaseyana), Bitterbrush (Purshia tridentata), Idaho Fescue (Festuca idahoensis), Squirreltail (Elymus elymoides), and a few other grasses and forbs often occur as associates. On more mesic sites, such associates may include trees such as Western Juniper (Juniperus occidentalis), scattered Ponderosa Pine (Pinus ponderosa), Lodgepole Pine (P. contorta ssp. murrayana), White or Red Firs (Abies concolor, A. magnifica) and a variety of shrubs in the Upper Montane Mixed Chaparral Alliance such as Greenleaf Manzanita (Arctostaphylos patula). Due to its low tolerance to fire, Curlleaf Mountain Mahogany is restricted to rocky areas and many of its stands are relatively old due to their locations in low-frequency fire areas which lack deep soil profiles and do not support much understory vegetation. This dominant species may occur in two growth forms, a shrub form that occurs in more scattered sites and a small tree form that occurs in dense thickets.

BQ
GREAT BASIN MIXED SCRUB ALLIANCE

A mixture of common Great Basin shrubs that has no single dominant shrub defines this alliance, which has been mapped occasionally in the Modoc and Cascade Sections at elevations between about 4000 – 8400 ft (1220 – 2652 m). Slopes are mainly flat, geologic substrates are diverse and the species mixture is quite variable, depending on location. Big Basin and Mountain Sagebrush (Artemisia tridentata ssp. tridentata, A. t. ssp. vaseyana), Low Sagebrush (A. arbuscula), Curlleaf Mountain Mahogany (Cercocarpus ledifolius), Bitterbrush (Purshia tridentata), Rabbitbrush (Chrysothamnus spp.) and other Sagebrushes (Artemisia spp.) are usually present in various mixtures, in addition to Desert Peach (Prunus andersonii). Species of Snowberry (Symphoricarpos spp.) and tree and/or shrubby Quaking Aspen (Populus tremuloides) are often present on these sites. Bitter Cherry (Prunus emarginata) or occasionally Western Chokecherry (Prunus virginiana var. demissa) also may be present in this mixture in this zone. Conifer associates in the immediate vicinity often include Jeffrey or Lodgepole Pine (Pinus jeffreyi, P. contorta ssp. murrayana), White Fir (Abies concolor) and Western Juniper (Juniperus occidentalis var. occidentalis).

BR
RABBITBRUSH ALLIANCE

This Alliance is identified by the dominance of any species of Rabbitbrush (Chrysothamnus spp.) alone or in mixed combinations. Rubber Rabbitbrush (Chrysothamnus nauseosus), for example, has been found in pure stands on disturbed sites in northern areas of the Cascades Section and several subsections of the Modoc Section. These sites have been mapped on low elevation dry slopes and flats at elevations between about 2400 – 6800 ft (732 – 2074 m). Typical sites include farmed rangelands, areas which burned, road berms, and silvicultural units in which the plantations have failed, especially in Eastside Pine areas. These stands are persistent and may sprout when burned or mechanically disturbed. Associated tree and shrub species may include Low and Mountain Sagebrush (Artemisia arbuscula, A. tridentata ssp. vaseyana),

Jeffrey and Ponderosa Pine (Pinus jeffreyi, P. ponderosa), Western Juniper (Juniperus occidentalis) and shrubs such as Greenleaf Manzanita (Arctostaphylos patula). Other grass species include Bromes (Bromus spp.), Squirreltail (Elymus elymoides), historically planted Wheatgrasses (Agropyron spp.), and a variety of annual forbs.

BS
BIG (BASIN) SAGEBRUSH ALLIANCE

Big Sagebrush (Artemisia tridentata) occurs as a dominant shrub species in this alliance over much of this zone, being especially common in the Modoc Section. Subspecies are not distinguished in this alliance. It is usually found on volcanic and basaltic flows which form broad, flat expanses and also on meadow edges, occupying degraded old meadow sites with lowered water tables. Mapped elevations are between about 2400 – 8000 ft (732 – 2440 m). Bitterbrush (Purshia tridentata), Low Sagebrush (A. arbuscula), Rubber Rabbitbrush (Chrysothamnus nauseosus), Wheatgrass (Agropyron spp.), and Fescue (Festuca spp.) are associated species. Big Sagebrush also occurs with Ponderosa Pine (Pinus ponderosa) and Western Juniper (Juniperus occidentalis) on mid-elevation slopes without rock outcrops; upper elevation sites are more likely to have minor inclusions of Lodgepole Pine (P. contorta ssp. murrayana), Quaking Aspen (Populus tremuloides) and trees in the Mixed Conifer – Fir Alliance.

BX
GREAT BASIN – MIXED CHAPARRAL TRANSITION ALLIANCE

This type is a mixture of montane mixed shrub species such as Snowbrush (Ceanothus velutinus), Greenleaf Manzanita (Arctostaphylos patula) and Cherry (Prunus spp.) with an equivalent vegetation cover of Great Basin shrubs such as various subspecies of Big Sagebrush (Artemisia tridentata), Bitterbrush (Purshia tridentata) and Curlleaf Mountain Mahogany (Cercocarpus ledifolius). This transitional type has been mapped in the Modoc and Cascade Sections at elevations between about 2800 – 7600 ft (854 – 2318 m). Alliances that are typically associated with this one spatially include Eastside Pine, Mixed Conifer – Fir, Western Juniper, Greenleaf Manzanita and Upper Montane Mixed Chaparral.

C1
ULTRAMAFIC MIXED SHRUB ALLIANCE

Serpentinized and ultramafic rocks do not occur in this zone except for very sparse occurrences towards the northwest and southeast of the area. Ultramafic rocks touch the Shingletown – Paradise Subsection (Cascades Section) in the south and were mapped as the Ultramafic Mixed Shrub Alliance. Shrubs such as Wedgeleaf Ceanothus (Ceanothus cuneatus), Whiteleaf Manzanita (Arctostaphylos viscida), Hoary Coffeeberry (Rhamnus tomentella) and Poison Oak (Toxicodendron diversilobum) are identified in this type. Occasional McNab Cypress (Cupressus or Callitropsis macnabiana), and Douglas-Fir (Pseudotsuga menziesii) often occur adjacent to these sites. Elevations are less than about 2400 ft (732 m).

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. It has been mapped very sparsely in the Cascades Section at elevations between about 3200 – 3800 ft (976 – 1158 m). The Eastside Pine Alliance is adjacent to these sites. In this zone, Wedgeleaf (C. cuneatus), Snowbrush (C. velutinus), Pinemat Ceanothus (C. diversifolius), Mahala Mat (C. prostratus) and/or Deerbrush (C. integerrimus) with the possibllity of Mountain Whitethorn (C. cordulatus) are likely to be present in this mixture.

CG
GREENLEAF MANZANITA ALLIANCE

Greenleaf Manzanita (Arctostaphylos patula) forms almost pure stands following intense fires and heavy soil disturbance partially due to its vigorous stump (burl) sprouting abilities (if burl is present at all), but it is shade intolerant and will eventually diminish as tree stand canopy increases. The soils are typically dry

with coarse surface textures that drain rapidly. This alliance has been mapped occasionally in both the Modoc and Cascade Sections at elevations in the range of about 4000 – 7600 ft (1220 – 2318 m). Conifer associates include Yellow Pines (Pinus ponderosa, P. jeffreyi) and True Firs (Abies concolor, A. magnifica). Shrubs found adjacent to and in minor amounts on these sites typically are those in both the Great Basin Mixed Scrub and Upper Montane Mixed Chaparral Alliances such as Sagebrush species (Artemisia spp.) and low-growing Ceanothus or Manzanita species. Cheatgrass (Bromus tectorum) and annual forbs are common in the understory, utilizing the fall and spring rains. Native grasses from these historic grasslands still exist in scattered patches, and include Western Needlegrass (Achnatherum occidentalis), Squirreltail (Elymus elymoides), and possibly Needle-and-Thread (Hesperostipa comata).

CH
HUCKLEBERRY OAK ALLIANCE

One of the few ultramafic areas in this area occurs on the western edge of the Upper Shasta Valley Subsection in the Cascades Section. Huckleberry Oak (Quercus vaccinifolia) has been mapped very sparsely there as a dominant shrub in contrast to the shrub mixture characterizing the Ultramafic Mixed Shrub Alliance in other areas. These sites are at elevations below about 6000 ft (1830 m).

CJ
BREWER OAK ALLIANCE

Dense Brewer Oak (Quercus garryana var. breweri) shrub thickets more commonly occur in the North Coast and Montane Calveg zone to the west of this area. However, this alliance of dominant Brewer Oak has also been mapped sparsely in the Cascades Section of this zone at elevations within the range of about 3000 – 5800 ft (915-1768 m). These sites are typically adjacent to dry grasslands, Western Juniper (Juniperus occidentalis var. occidentalis), Ponderosa Pine (Pinus ponderosa) stands and a diverse mixture of shrubs such as Huckleberry Oak (Q. vaccinifolia) and Greenleaf Manzanita (Arctostaphylos patula).

CL
WEDGELEAF CEANOTHUS ALLIANCE

This Wedgeleaf Ceanothus (Ceanothus cuneatus) dominated Alliance occurs extensively in the Cascades and Modoc Sections within an elevation range of about 1400 – 5000 ft (427 – 1524 m). It invades some disturbed, nutritionally deficient, or burned areas, but is more typically a component of the Lower Montane Chaparral Alliance elsewhere. These sites are spatially associated with Western Juniper (Juniperus occidentalis var. occidentalis), Oregon White Oak (Quercus garryana), Big Sagebrush (Artemisia tridentata) and dry grasslands.

CM
UPPER MONTANE SHRUB ALLIANCE

This mixed shrub Alliance occurs in harsh, exposed sites above about 5800 ft (1768 m) in scattered locations of the Cascades Section. The major species include low-growing shrubs that are often under winter snows, such as Mahala Mat (Ceanothus prostratus), Pinemat Manzanita (Arctostaphylos nevadensis), Snowbrush (Ceanthus velutinus), and Bush Chinquapin (Chrysolepis sempervirens). This Alliance generally occurs in geographical association within and above the Mixed Conifer - Fir and Red Fir Alliances. Occasional associates include Cream Bush (Holodiscus microphyllus), Bitter Cherry (Prunus emarginata), and Greenleaf Manzanita (Arctostaphylos patula).

CN
PINEMAT MANZANITA ALLIANCE

This high-elevation shrub Alliance consists of patches of Pinemat Manzanita (Arctostaphylos nevadensis) on sites that do not support conifer growth within Red or White Fir (Abies magnifica, A. concolor), Whitebark Pine (Pinus albicaulis) and Lodgepole Pine (P. contorta ssp. murrayana) open forests. Soils are usually shallow or rocky. This Alliance has been mapped sparsely in the Modoc and Cascade Sections at elevations between about 5600 – 9000 ft (1708 – 2745 m). It intergrades with the Upper Montane Shrub

Alliance, usually at lower elevations that are capable of supporting shrubs such as Mahala Mat (Ceanothus prostratus).

CP
BUSH CHINQUAPIN ALLIANCE

Pure stands of Bush Chinquapin (Chrysolepis sempervirens) are often initiated and maintained after disturbances in montane conifer sites such as through fire, logging, landslides, or windthrow. This alliance has been mapped very sparsely in the Modoc and Cascades Sections at elevations between about 4200 – 6400 ft (1280 – 1952 m). White Fir (Abies concolor) and Greenleaf Manzanita (Arctostaphylos patula) are typically found adjacent to these sites.

CQ
LOWER MONTANE MIXED CHAPARRAL ALLIANCE

This low-elevation mixed chaparral Alliance has been identified in the Cascades Section (commonly found in the Hat Creek Rim, Old Cascades and Shingletown - Paradise Subsections) at elevations generally under 4800 ft (1464 m). Its indicator species are Wedgeleaf Ceanothus (Ceanothus cuneatus), Birchleaf Mountain Mahogany (Cercocarpus betuloides) and Whiteleaf Manzanita (Arctostaphylos viscida) in western areas such as Shasta Valley. Typically, low elevation westside indicator species, such as Toyon (Heteromeles arbutifolia) and Chamise (Adenostoma fasciculatum) are absent in this zone. Species such as Sierra Plum (Prunus subcordata), Bitter Cherry (Prunus emarginata), Western Chokecherry (Prunus virginiana var. demissa), Ribes spp., Creeping Snowberry (Symphoricarpos mollis), and at the upper elevations of this Alliance, Greenleaf Manzanita (Arctostaphylos patula), are commonly found within this Alliance towards the east. Tree associates of this diverse type include California Black Oak (Quercus kelloggii), Douglas-Fir (Pseudotsuga menziesii), Ponderosa Pine (Pinus ponderosa) and Canyon Live Oak (Q. chrysolepis). Older maps may still carry the label “CC” for this type.

CS
SCRUB OAK ALLIANCE

The mixed Scrub Oak Alliance is rare in this area, intergrading with the Lower Montane Mixed Chaparral Alliance below about 5000 ft (1524 m) and forming localized patches within it. It has been identified only in extreme southwestern parts of the Cascades Section (Shingletown - Paradise Subsection) in this area that adjoins the Sierra Nevada Foothills Section (Tuscan Flows Subsection) of the Central Valley Calveg zone to the south. The Alliance is a mixture of shrub oaks such as Huckleberry (Quercus vaccinifolia), Sadler (Q. sadleriana), and shrub forms of Oregon White Oak (Q. garryana var. breweri) and Canyon Live Oak (Q. chrysolepis var. nana). Species within this Alliance stump sprout after fire and may fully occupy the site within ten years under optimum conditions. Since there is hybridization between the Quercus species, identifications of shrubby oaks are sometimes difficult to make.

CV
SNOWBRUSH ALLIANCE

Snowbrush (Ceanothus velutinus var. velutinus), a strongly sprouting shrub of upper montane regions, is a common species in this area. Snowbrush may invade deep, well-drained soils after fire or logging but occurs on both good and poor soils, with density and vigor of the stand being an indicator of local site conditions. It occurs as brush fields of dominant Snowbrush in several subsections of the Modoc Section, having been mapped occasionally within the elevation range of the Mixed Conifer – Fir and White Fir Alliances, from about 5000 – 8000 ft (1524 – 2440 m). Shrubs such as Greenleaf Manzanita (Arctostaphylos patula), Sierra Plum (Prunus subcordata) and Bitter Cherry (Prunus emarginata) and Great Basin shrubs such as Mountain Sagebrush (Artemisia tridentata spp. vaseyana) and Low Sagebrush (A. arbuscula) may also be onsite and/or adjacent to these areas.

CW
WHITELEAF MANZANITA ALLIANCE

Whiteleaf Manzanita (Arctostaphylos viscida) is found scattered sparsely as a dominant shrub on volcanic flow deposits and non-marine coarse sedimentary deposits in western areas of the Upper Shasta Valley and High Cascades Subsections of the Cascade Section. It is usually found above 3000 ft (915 m) in these areas. This Alliance typically occurs adjacent to the Lower Montane Mixed Chaparral and White Fir (Abies concolor) Alliances in areas of low to moderate precipitation or those with good drainage.

CX
UPPER MONTANE MIXED CHAPARRAL ALLIANCE

This Alliance is a mixed shrub type containing species such as Greenleaf Manzanita (Arctostaphylos patula), Deerbrush (Ceanothus integerrimus), Mountain Whitethorn (Ceanothus cordulatus), Bush Chinquapin (Chrysolepis sempervirens), Huckleberry Oak (Quercus vaccinifolia), and Snowbrush (Ceanothus velutinus). It is common throughout the Cascades and Modoc Sections at elevations below about 8000 ft (2440 m). Other species, including Bitter Cherry (Prunus emarginata), Gooseberry (Ribes spp.), Mountain Snowberry (Symphoricarpos rotundifolius), and Western Serviceberry (Amelanchier pallida) may also occur in this Alliance, which is scattered in patches throughout the Mixed Conifer - Fir and Mixed Conifer – Pine Alliances. Large stands of this type occur on the Modoc Section after stand - replacing fires or silvicultural activities have removed the conifers in the Eastside Pine Alliance. On such slopes, Mountain Sagebrush (Artemisia tridentata ssp. vaseyana) and the grass Squirreltail (Elymus elymoides) may occur as additional associated species.

CY
MOUNTAIN WHITETHORN ALLIANCE

Mountain Whitethorn (Ceanothus cordulatus) may invade forests recently subjected to fire, logging, landslides, or other ground disturbances. More abundant in the Sierra Nevada Section to the south of this zone, it has been mapped on one site in the western region of the Cascades Section in the elevational range of about 4600 – 4800 ft (1402 – 1464 m). This stand is adjacent to the Knobcone Pine (Pinus attenuata) Alliance.

KQ
ASPEN (SHRUB)

Quaking Aspen (Populus tremuloides) will persist in a shrub form as snow-sculpted clones in high elevations of this zone. Such “krummholz aspen” stands have been mapped abundantly in the Warner Mountains Subsection (Modoc Section) at elevations between about 6200 – 8400 ft (1890 – 2562 m). These sites are often surrounded by tree-sized aspen clones where conditions are more favorable. Lodgepole Pine (Pinus contorta ssp. murrayana) and Mountain Sagebrush (Artemisia tridentata ssp. vaseyana) are typically associated with this alliance.

NM
RIPARIAN MIXED SHRUB ALLIANCE

Permanent water sources at or near the ground surface may occasionally support a community of shrubs. The Riparian Mixed Shrub Alliance has been mapped very sparsely in this zone in widely scattered areas of the Warner Mountains and Adin Mountains and Valleys Subsections of the Modoc Section. Elevations of such sites are between 4000 – 7200 ft (1220 – 2196 m). The mixture includes a diverse combination and densities of at least some of the following: shrub Willows (Salix spp.), shrubby White Alder (Alnus rhombifolia), Water and Resin Birch (Betula occidentalis, B. glandulosa), Silver Sagebrush (Artemisia cana), Interior Rose (Rosa woodsii) and Mountain Alder (Alnus incana ssp. tenuifolia).

TA
MOUNTAIN (THINLEAF) ADLER ALLIANCE

Mountain or Thinleaf Alder (Alnus incana ssp. tenuifolia), a deciduous riparian small tree or tall shrub, generally occurs in pure stands above about 4800 ft (1464 m) in this zone. It has been mapped in scattered areas in the High Cascade, McCloud Flat and Lassen – Almanor Subsections of the Cascades Section, mainly where stream courses and coarse, shallow or gravelly soils persist. These saturated or seasonally flooded sites are often adjacent to moist or wet large perennial grass and forb meadows in addition to conifers such as Red and White Firs (Abies magnifica, A. concolor) and Lodgepole Pine (Pinus contorta ssp. murrayana). The density of Mountain Alder stands often limits the growth of other species other than some aquatic graminoids and forbs.

TB
BITTERBRUSH – SAGEBRUSH ALLIANCE

Throughout much of this zone, Bitterbrush (Purshia tridentata) and Sagebrushes (Artemisia spp.) occasionally mix where neither is dominant in the shrub layer, forming the Bitterbrush – Sagebrush Alliance. It has been mapped abundantly in the Medicine Lake Lava Flows (Cascade Section) and Devil's Garden (Modoc Section) Subsections at varying densities and in eighteen other subsections. Bitterbrush is an important shrub to map at significant densities because of its high value as a wildlife browse species for mule deer and small mammals. It also provides cover and nesting sites for certain neotropical migrating and resident birds. Mapped elevations of this type are about 2600 – 7800 ft (792 – 2379 m).

Sagebrush species in this mixture may occupy different edaphically-determined sites in this area. For example, Big Basin Sagebrush (A. tridentata ssp. tridentata) is often found on less steep, gravelly sites while Mountain Sagebrush (A. tridentata ssp. vaseyana) is more common on higher or snow accumulation sites. Black Sagebrush (A. nova) does well on shallow, or stoney, gravelly soils in forest openings. Silver Sagebrush (A. cana) is often found on soils with high calcium carbonate concentrations, and in which the soil remains saturated throughout the spring. Low Sagebrush (A. arbuscula) may become locally dominant on low flats with shallow soils and restricted drainage. Conifers such as Ponderosa Pine (Pinus ponderosa), Western Juniper (Juniperus occidentalis var. occidentalis) and shrubs such as Low, Big Basin and Mountain Sagebrush are mainly associated with the alliance.

TS
SNOWBERRY ALLIANCE

Snowberry (species of Symphoricarpos) has two species that grow in the Modoc Section at different elevations and environments. They mix in the Warner Mountains, where this alliance of single or multiple species has been mapped on rocky sites or within forest gaps at elevations between about 6000 – 8600 ft (1830 – 2623 m). Roundleaf Snowberry (S. rotundifolius) generally has its best development at lower elevations and Creeping Snowberry (S. mollis) at higher subalpine zone elevations. Trees such as White Fir (Abies concolor), Quaking Aspen (Populus tremuloides) and Lodgepole Pine (Pinus contorta ssp. murrayana) and shrubs such as Mountain and Low Sagebrush (Artemisia tridentata ssp. vaseyana, A. arbuscula) may be found on or adjacent to these sites.

TT
BIG BASIN SAGEBRUSH ALLIANCE

Big Basin Sagebrush (Artemisia tridentata ssp. tridentata) is identified as a distinctive subspecies of Big Sagebrush (A. tridentata) and forms dominant stands in this alliance. This type is widespread and abundant in much of this zone, occurring very frequently in the Medicine Lake Lava Flows (Cascades Section) and five subsections of the Modoc Section and less abundantly in nine others. This lower elevation subspecies mixes with Bitterbrush (Purshia tridentata) in the Cascades Section and more often with Low Sagebrush (A. arbuscula) in the Modoc Section. Western Juniper (Juniperus occidentalis var. occidentalis) and Ponderosa Pine (Pinus ponderosa) are associates in both sections. The ground cover is often a mixture of dry annual grasses and forbs.

TU
SILVER SAGEBRUSH ALLIANCE

Silver Sagebrush (Artemisia cana) often occupies relatively moist to wet upper elevation, cool soils in this area to the exclusion of other Sagebrush species. These areas generally have a water table within one foot (3 m) of the soil surface such as snow catchment areas, streamsides, alkaline basins, etc. In contrast to most Sagebrushes, Silver Sagebrush has a vigorous sprouting ability after fires. The Silver Sagebrush Alliance has been mapped abundantly in the Devil's Garden Subsection and occasionally in four other subsections of the Modoc Section. It also occurs sparsely in the Old Cascades, High Cascade and Medicine Lakes Lava Flows Subsections of the Cascades Section, being identified at elevations up to about 7400 ft (2256 m). Herbaceous species associated with this type include Mat Muhly (Muhlenbergia richardsonis), Nebraska Sedge (Carex nebrascensis) and Tufted Hairgrass (Deschampsia caespitosa). Low (A. arbuscula) or Black Sagebrush (A. nova) may be associated with this type on seasonally moist sites that drain rapidly in the summer

TV
MOUNTAIN SAGEBRUSH ALLIANCE

The Mountain Sagebrush (Artemisia tridentata ssp. vaseyana) subspecies of Big Sagebrush (A. tridentata) forms dominant stands at somewhat higher elevations than does Big Basin Sagebrush (A. t. ssp. tridentata). This alliance, in which it is the dominant shrub, is very commonly encountered in the Cascades Section and has been mapped prominently in the Warner Mountains, Crowder Flat, Adin Mountains and Valleys and Horsehead Mountain Subsections of the Modoc Section. It also has been identified in twelve other subsections. Elevations of these sites are generally up to about 9000 ft (2745 m). Snowfield Sagebrush (A. spiciformis or A. t. ssp. spiciformis) is reputed to occur at high elevations in the Warner Mountains and elsewhere and may be present on Mountain Sagebrush sites. At lower elevations, Big Basin Sagebrush may become more prominent below about 6000 ft (1830 m), as Mountain Sagebrush appears to have higher moisture requirements such as the presence of late-melting winter snow cover. Trees such as Ponderosa and Lodgepole Pines (Pinus ponderosa, P. contorta ssp. murrayana), White Fir (Abies concolor) and Western Juniper (Juniperus occidentalis var. occidentalis) and shrubs such as Low Sagebrush (A. arbuscula), Curlleaf Mountain Mahogany (Cercocarpus ledifolius) and Greenleaf Manzanita (Arctostaphylos patula) in minor amounts may be onsite or in the immediate vicinity of these sites.

TW
WYOMING SAGEBRUSH ALLIANCE

Wyoming Big Sagebrush (Artemisia tridentata ssp. wyomingensis) is a widespread taxon occurring from California east to the plains states. It is present only sparingly in California but is very common in arid areas of other western states. In this zone, it is dominant in this alliance and has been mapped very sparsely in sometimes disturbed sites in the Devil's Garden (Modoc Section) and Medicine Lake Lava Flows (Cascade Section) Subsections in the elevation range of about 4000 – 4400 ft (1220 – 1342 m). Associates include Western Juniper (Juniperus occidentalis var. occidentalis) and other Sagebrush species.

WL
WILLOW (RIPARIAN SCRUB)

Shrub forms of Willow (Salix spp.) are defined in this Alliance where they dominate the shrub layer in a riparian, seep or meadow site. The alliance has been mapped sparsely in seventeen subsections of this area at elevations between about 2000 – 7600 ft (1610 – 2318 m). These moist sites are sometimes found adjacent to Quaking Aspen (Populus tremuloides) stands and wet perennial grasses and forbs. Any combination of shrubby Willows such as Arctic (S. arctica), Booth's (S. boothii), Sierra (S. eastwoodiae), Narrowleaf (S. exigua), Geyer's (S. geyeriana), Jepson's (S. jepsonii), Lemmon (S. lemmonnii), Strapleaf (S. liguifolia) and/or MacKenzie's (S. prolixa) may be expected to occur in this region.

WM
BIRCHLEAF MOUNTAIN MAHOGANY ALLIANCE

The northern form of Birchleaf Mountain Mahogany (Cercocarpus betuloides var. macrourus) will occasionally dominate an open site in this area on mid-montane, dry slopes. It has been mapped very sparsely only in the Old Cascades Subsection of the Cascades Section at elevations in the vicinity of 3400 – 4400 ft (1036 – 1342 m). Shrubs of the Lower Montane Chaparral mixture such as Wedgeleaf Ceanothus (C. cuneatus) are adjacent to these sites.

HERBACEOUS

AC
ALPINE GRASSES AND FORBS ALLIANCE

This alpine type consists of perennial herbs or dwarf rosette forms, such as basal-leaved "cushion plants". It forms a low turf on favorable sites but is more often scattered among the rocks and gravel areas above the tree frostline. Alpine cushion plants are often subject to severe winds and very low temperatures in winter due to their presence on windward slopes that are sometimes blown almost clear of snow. They also occur on more protected slopes that accumulate deep snowdrifts which may persist until midsummer or later, limiting their growing season, as well as more windblown scree or talus slopes. The substrate is rocky, with little soil development and excellent drainage. Such sites are limited in this zone but have been sparsely mapped at elevations above about 7000 ft (2135 m) in both the Modoc and Cascade Sections, often within openings of Whitebark Pine (Pinus albicaulis) and Red Fir (Abies magnifica) woodlands and forests. The following herbaceous species may occur in this area: species of Draba, Indian Paintbrush (Castilleja spp.), Mountain Sorrel (Oxyria digyna), Sibbaldia (S. procumbens), Fellfields Claytonia (C. megarhiza), Ivesia gordonii, Rock Cress (Arabis lyallii), Beardtongue (Penstemon davidsonii), Sandwort (Arenaria aculeata), Silky Raillardella (R. argentea) and grasses such as Trisetum spicatum.

HG
ANNUAL GRASSES AND FORBS ALLIANCE

Annual grasslands have been mapped very frequently in the Modoc and Cascades Sections of this zone, usually at elevations below about 8400 ft (2562 m). These areas are often stands of introduced (non-native and often Eurasian) annual grasses that occupy formerly perennial native grasslands or native conifer stands which have been disturbed through fire, agriculture, livestock grazing and the like. Cheatgrass (Bromus tectorum), Wild Oats (Avena spp), Foxtail Chess (B. madritensis), Ripgut Grass (B. diandrus) and a variety of annual and biennial forbs such as Dwarf and Oregon Woolly Marbles (Psilocarphus brevissimus, Psilocarphus oregonus), Starthistle or Knapweed (Centaurea spp.), Thistles of various genera (especially Onopordum spp. and Cirsium spp.), Dyer's Woad (Isatis tinctoria) and Filaree (Erodium spp) may be undesirable parts of this mixture. Medusahead (Taeniatherum caput-medusae) an aggressive exotic and non-forage annual grass, invades many acres of semiarid rangelands of this region and is difficult to control. Small areas of perennial grasses, found in moist, lightly grazed or relic prairie areas may be included here, being represented by species of Needlegrass (Achnatherum spp.) and Idaho Fescue (Festuca idahoensis). Vernal pools, found in small depressions with a hardpan soil layer also may occur adjacent to or within these areas. Areas in which vernal pools occur are often indicated by the presence of Dwarf and Oregon Woolly Marbles (Psilocarphus brevissimus, Psilocarphus oregonus) and ephemeral herbaceous species such as Downingia spp. and Meadowfoam (Limnanthes spp.).

HJ
WET MEADOWS (WET GRASSES AND FORBS) ALLIANCE

The characteristic vegetation of this Alliance varies from a grass-sedge-rush community typically found along meadows adjacent to stream courses to an emergent marsh community adjacent to lower elevation lakes in this zone. Wet meadows occur on level or gently sloping sites with water available throughout the growing season. They have been mapped at elevations up to about 8600 ft (2623 m) in the Modoc and

Cascades Sections. Included in this Alliance are the grasses Hairgrass (Deschampsia spp.) and Mountain Timothy (Phleum alpinum), and additionally, Alkaligrass (Puccinellia spp.) in some saline meadows. Common forbs include Clover (Trifolium spp.), False Hellebore (Veratrum californicum), Monkeyflower (Mimulus spp.), and Buttercup (Ranunculus spp.). Shrub and tree cover is usually sparse, but may be important at the meadow or water's edge. These species may include Willow (Salix spp.), Quaking Aspen (Populus tremuloides), White Alder (Alnus rhombifolia), and Lodgepole Pine (Pinus contorta ssp. murrayana). The timing and reliability of available water largely determines the vegetational stability of the species composition of this Alliance. Areas having seasonal hydric fluctuations are often populated by species not dependent on constant water level such as Douglas' Sedge (Carex douglasii), certain Rushes (Juncus spp.), Bluegrass (Poa spp.), Needlegrass (Achnatherum spp.), and annual grasses such as Oatgrass (Danthonia spp.). These indicate the proximity of dry, moist and wet meadows in many areas of this zone. Additionally, some wet meadows are often bordered by semiarid shrubs such as Big Sagebrush (Artemisia tridentata) and Rabbitbrush (Chrysothamnus spp.).

HM
PERENNIAL GRASSES AND FORBS ALLIANCE

Large areas of the Modoc Section of this zone have been mapped as a form of dry grassland in which it is not possible to determine species composition. This type occurs less abundantly in the Cascades Section as well. Historically, perennial native grasslands such as Western Needlegrass (Achnathereum occidentalis) and Columbia Needlegrass (A. nelsonii) have dominated these areas, but influences such as fire suppression and grazing have altered the species compositions, often to annual grasslands. However, perennial grasslands still occur in this region and have been mapped at elevations above about 4000 ft (1220 m). At higher elevations in the Cascades Section, as well as further east, perennial grasses occur intermixed with conifer forests. Other common plant species in this Alliance include Squirreltail (Elymus elymoides), and Thickspike Wheatgrass (Elymus lanceolatus). Throughout the Red Fir, Eastside Pine, and Western Juniper Alliances, Mules-ears (Wyethia mollis) represents an indicator species of this type on open sites having coarse, gravelly soils. Others in this species mix may include Rock Cress (Arabis spp.), Monardella (Monardella spp.) and Buckwheat (Eriogonum spp.). Non-native perennial grasses such as Desert, Crested, Tall and Intermediate Wheatgrass (Agropyron desertorum, Elytrigia elongata, E. intermedia) and Tall Fescue (Festuca arundinacea), forbs such as Hoary Cress (Cardaria draba) and Mediterranean Sage (Salvia aethiopis) and legumes such as Strawberry Clover (Trifolium fragiferum) and other undesirable species may be included in this type.

HT
TULE – CATTAIL ALLIANCE

Cattial or Tule marshes occur near lakes and springs in very few locations in this general area of the state, but nevertheless have been identified and mapped in both Modoc and Cascades Sections sparingly at elevations up to about 4800 ft (1464 m). Dominant species include Sedges (Carex spp.), Tule or Bulrush (Scripus spp.), Cattail (Typha spp.), Rushes (Juncus spp.) and Spikerush (Eleocharis spp.). A number of other species are associated with this alliance, including the invasive forb Purple Loosestrife (Lythrum salicaria). Past drainage activities have significantly reduced the total area once covered by this alliance.

NON-NATIVE VEGETATION

IB
URBAN-RELATED BARE SOIL

Urban development in California occurs in phases. When land is cleared prior to being paved, this category represents the occurrence of non-vegetated barren ground that is caused by urbanization projects. 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 has been mapped occasionally in the Modoc and Cascades Sections, mainly representing mines and transportation corridors.

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.

IF
NON-NATIVE / INVASIVE FORB AND GRASS ALLIANCE

Riparian and upland areas in California are often invaded by aggressive herbaceous species that are not native to the state or area. Without managed control, these areas become difficult to use for agricultural or recreational land purposes and often require multi-year restoration procedures, including weeding, burning and reseeding with desirable species. This type is defined by those areas in which the invasion of such species on the landscape is large enough to become a mappable area. Other alliances, epecially the Annual Grasses and Forbs type, may have exotic species in the mixture, but usually are not dominated by a single herbaceous or grass species, as is usual in this type. Some of the problem species include Perennial Peppergrass (Lepidium latifolium), which may cause illness in horses, Russianthistle (Salsola tragus), which is an alternate host for an insect that devastates certain crops, Knapweeds (Centaurea spp.), which can be toxic to livestock and pose challenges to eradicate, Scotch Thistle (Onopordum acanthium), Leafy Spurge (Euphorbia esula), Musk Thistle (Carduus nutans), Medusahead Grass (Taeniatherum caput-medusae) and many others. Fortunately, this type has been mapped and identified only rarely in this zone.

IG
NON-NATIVE/ORNAMENTAL GRASS ALLIANCE

Ornamental or non-native grass species define this Alliance. In contrast to other non-native types, this one is usually cultivated and desired for landscape planning operations. 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 and usually cultivated hardwood species dominate this Alliance. Other non-native conifers, shrubs and grasses may be present in minor amounts in areas mapped as 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 cultivated 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, but are present less prominently in discrete units. 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 planted shrub species dominate this Alliance. Other non-native conifers, hardwoods and grasses may be present in this Alliance, but less prominently. 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. Such features as golf course ponds, small lakes in public parks, water and sewage treatment facilities and the like are included in this type. This category 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 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 pines or cypresses.

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 the conservation of moisture and nutrients in a crop rotation schedule.

A4
ORCHARD AGRICULTURE

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

A5
FLOODED ROW CROP AGRICULTURE

Agricultural lands planted to row crops are periodically flooded using flow-through structures such as levees, ditches and irrigation boxes in certain seasons for the production of wild and other rices in California. These areas are often underlain by poorly drained clay soils or other hardpans 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 migrated 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, millets, 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 multiple uses, such as flax and cotton for their seed oils (linseed and cottonseed oils), fibers and medicinal uses, if any.

A7
AGRICULTURE PONDS AND 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 surface 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

This general category is used for mapped areas in which specific agricultural production categories are not determined. 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 or gypsum areas, and the like. It does not include areas considered as modified or developed, as in urban or agricultural areas.

SN
SNOW/ICE

Permanent or long-term snow and ice fields are found on the tallest peaks of the Southern Cascades, including Mt. Shasta, where it has been mapped. Snow/Ice may also 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.

UB
URBAN OR DEVELOPED

This general category applies to landscapes that are dominated by urban structures, residential units, or other developed land use elements such as highways, city parks, cemeteries, etc. In those cases in which the managed landscapes may have a considerable vegetation or identified non-vegetated component, other

land use categories may be more appopriate, such as Ornamental Conifer and Hardwood mixtures within city parks, developed water sources in parks and recreation areas, paved areas, etc. .

WA
WATER

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