

Hierarchical Field and Mapping Key to the Vegetation of the Proposed Tehachapi Pass High-Speed Rail Corridor



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This key is for the vegetation types mapped in support of the proposed Tehachapi Pass Corridor and is based on the classification developed by analyzing survey data for this and other relevant projects. It is intended for use as a guide to identification of field-based and image interpretation-based vegetation assessments. This key is not dichotomous; instead it follows the *Manual of California Vegetation* (Sawyer et al. 2009), which conforms to the hierarchy of the United States National Vegetation Classification (USNVC) that was current at that time. The USNVC hierarchy is promoted by the Federal Geographic Data Committee (FGDC) and the Ecological Society of America's Vegetation Panel (FGDC 2008, Faber-Langendoen et al. 2009).

Due to the high diversity of the vegetation communities in the area, this is a complex key. You will need to collect or refer to plant composition data that includes not only those species that are dominant but also those "indicator," or characteristic/diagnostic species, whose presence may cause a stand to key to another vegetation type. If you are using this key for mapping rules please also note that some of the types are typically below the accurate detectability for mapping in this project.

Terms and Concepts used throughout the Key

United States National Vegetation Classification (USNVC): A central organizing framework for how all vegetation in the United States is inventoried and studied, from broad-scale formations (biomes) to fine-scale plant communities. The purpose of the USNVC is to produce uniform statistics about vegetation resources across the nation, based on vegetation data gathered at local, regional, or national levels. The latest classification standard was published by the Federal Geographic Data Committee (2008).

The hierarchy units in the USNVC from highest to lowest (i.e., broadest to finest) are:

1. Class
2. Subclass
3. Formation
4. Division
5. Macrogroup
6. Group
7. Alliance
8. Association

Stand: The basic physical unit of plant communities in a landscape. It has no set size. Some vegetation stands are very small, such as certain wetland types, and some may be several square kilometers in size, such as certain forest types.

A stand is defined by two main unifying characteristics:

1. It has compositional integrity. Throughout the stand, the combination of species is similar. The stand is differentiated from adjacent stands by a discernible boundary that may be abrupt or occur indistinctly along an ecological gradient.
2. It has structural integrity. It has a similar history or environmental setting that affords relatively similar horizontal and vertical spacing of plant species. For example, a hillside forest originally

dominated by the same species that burned on the upper part of the slopes but not the lower would be divided into two stands. Likewise, a sparse woodland occupying a slope with very shallow rocky soil would be considered a different stand from an adjacent slope with deeper, moister soil and a denser woodland or forest of the same species.

Three concepts that apply to the definition of a stand include:

1. *Homogeneity*: The structural and compositional features of a stand described above are often combined into a term called homogeneity. For an area of vegetated ground to meet the requirements of a stand, it must have similar structural and compositional features and thus be "homogeneous" at the scale being considered.
2. *Plant Dispersion/Distribution (sociability) in semi-deserts and sparsely vegetated landscapes*: For all desert vegetation, an even distribution of species in the dominant layer is an important factor in correctly identifying stands at the alliance and/or association level. Whatever the dominant overstory layer, the diagnostic species in that layer should be evenly distributed across the stand being assessed. This applies to riparian stands characterized by *Salix* or *Populus*; desert scrub with species such as *Larrea*, *Atriplex*, or *Encelia*; or herbland/grassland stands with species such as *Coreopsis*, *Amsinckia*, *Eriogonum*, *Pleuraphis*, or *Bromus*. Therefore, when using this key in the field or with high resolution aerial imagery, it is important to assess not just the estimated cover of the diagnostic species in their layer(s), but also reflect upon their dispersion across the stand.
3. *Irregular Plant Dispersion due to Disturbance*: Irregular distribution of species across a stand suggests a history of recent disturbance and makes precise determination of vegetation type more difficult. In some cases due to disturbances such as recent fire or clearing, desert vegetation may not be identifiable to the alliance level and can only be described at higher levels such as group or macrogroup (the key is arranged in the general order of the USNVC hierarchy for situations like this). In other cases, early seral vegetation may have diagnostic opportunistic species such as *Ambrosia* *salsola*, *Ericameria cooperi*, *E. nauseosa*, or *Encelia actoni* that quickly colonize and form stands that may be mapped to alliance. However, if such stands are left undisturbed for several years, they may shift to more stable and structurally diverse stands of a different alliance.

Alliance: Plant communities based on dominant/diagnostic species of uppermost or dominant stratum. Accepted alliances are part of the United States National Vegetation Classification (USNVC) hierarchy.

Association: The most botanically detailed plant community designation based on dominant species and multiple co- or sub-dominant indicator species from any strata. Associations are also part of the USNVC hierarchy.

Plant community nomenclature: Species separated by "-" are within the same stratum; species separated by "/" are in different strata.

Cover: The primary metric used to quantify the importance/abundance of a particular species or a particular vegetation layer within a stand. It is measured by estimating the aerial extent of the living plants, or the bird's-eye view looking from above, for each category. Cover in this mapping project uses the concept of "porosity" or foliar cover rather than "opacity" or crown cover. Thus, field crews and aerial photo interpreters are trained to estimate the amount of light versus shade produced by the canopy of a plant or a stratum by taking into account the amount of shade it casts excluding the

openings it may have in the interstitial spaces (i.e., between leaves or branches). This is assumed to provide a more realistic estimate of the actual amount of shade cast by the individual or stratum which, in turn, relates to the actual amount of light available to individual species or strata beneath it. However, as a result, cover estimates can vary substantially between leaf-on versus leaf-off conditions.

Absolute cover: The actual percentage of the surface area of the survey that is covered by a species or physiognomic group (trees, shrubs, herbaceous), as in "*Larrea tridentata* covers 10 percent of the stand being surveyed." Absolute cover of all species or physiognomic groups, when added together, may total greater than 100 percent, because this is not a proportional number and plants can overlap with each other. For example, a vegetation survey could report 25 percent tree cover in the upper layer, 40 percent shrub cover in the middle layer, and 50 percent herbaceous cover on the ground, for a total of 115 percent. However, when cover is estimated using aerial photointerpretation, the maximum absolute value is 100 percent, since overlapping layers of vegetation cannot be seen from above.

Relative cover: The percentage of surface area within a polygon that is covered either by one species relative to other species within the same physiognomic stratum (tree, shrub, herbaceous) or one stratum relative to the total vegetation cover in a polygon. Thus, 50 percent relative cover of *Quercus douglasii* in the tree layer means that *Q. douglasii* comprises half the cover of all tree species within a stand, while 50 percent relative shrub cover means that shrubs make up half the cover of all vegetation within a stand. Relative cover values are proportional numbers that, when added together, total 100 percent for all species within a stratum or all strata within a stand of vegetation.

Dominance: Dominance refers to the preponderance of vegetation cover in a stand of uniform composition and site history. It may refer to cover of an individual species, as in "dominated by *Larrea tridentata*," or it may refer to dominance by a physiognomic group, as in "dominated by shrubs." When we use the term in the key, a species is dominant if it is in at least 80 percent of the stands of this type, with at least 50 percent relative cover in each stand (for exceptions, see "dominance by layer" below).

Strongly dominant: A species in the dominant lifeform stratum that has 60 percent or greater relative cover.

Co-dominant: Co-dominance refers to two or more species in a stand with similar cover. Specifically, each species has between 30 to 60 percent relative cover. For example, in a desert scrub stand with 5% *Larrea tridentata*, 4% *Ambrosia dumosa*, and 3% *Ephedra nevadensis* (total of 12% shrub cover), technically only the *Larrea* ($5/12 = 41\%$ relative cover) and the *Ambrosia* ($4/12 = 33\%$ relative cover) would be co-dominant because *Ephedra* would only have 25% relative cover ($3/12 = 25\%$ relative cover).

Characteristic/Diagnostic species: These should be present in at least 80 percent of the stands of the type, with no restriction on cover. Relatively even spacing throughout the stand is important, particularly in vegetation with low total cover, since an even distribution of the diagnostic species is a much better indicator than overall cover. Characteristic species that are evenly distributed are better indicators of a type than species with higher cover and patchy distribution.

Dominance by layer: Tree, shrub, and herbaceous layers are considered physiognomically distinct. A vegetation type is considered to belong to a certain physiognomic group if it is dominated by one layer. Layers are prioritized in order of height. If the tallest layer is dominant and characteristic (see definitions above) across multiple stands of one type, the alliance is usually named by the dominant and/or characteristic species of the tallest layer. Average covers within the dominant layer reflect the

"modal" concept of the characteristics of a particular vegetation type. For example, a higher average cover of woody plants within a stand not recently affected by disturbance reflects a mode of general availability of water, nutrition, and equitable climate, while lower average cover under similar conditions would reflect lower availability of these things.

Layer dominance concepts are relative to higher levels in the classification (usually from Macrogroup to Formation levels) that are driven by regional climate. This is an important concept in this mapping area where, for example, desert shrublands meet California Mediterranean climate shrublands or montane woodlands. Although rules within the Mojave-Sonoran desert may discuss *Yucca brevifolia* having a threshold membership rule of >1% cover with even distribution, when *Y. brevifolia* occurs in more of a Mediterranean setting, over a much more dense and evenly distributed sclerophyllous shrub cover of *Adenostoma fasciculatum* or *Quercus john-tuckeri*, that rule for the desert does not apply and that stand would key to the best characteristic species of the shrub layer (e.g., *A. fasciculatum*). In order to be keyed to a *Y. brevifolia* alliance, such a stand would have to contain at least 10% cover of *Y. brevifolia* over the sclerophyll layer, since for wetter, non-desert environments the rule for tree layer dominance is $\geq 10\%$ tree cover. This also applies to situations where *Pinus monophylla* occurs over chaparral, such as in portions of the foothills of the Transverse Ranges. Although *P. monophylla* may only need to be >1% cover in desert vegetation, it would need to be >10% when present in predominantly sclerophyllous Mediterranean scrub, which regularly has >25% shrub cover in a stand.

Sparse: Used to describe individual layers of vegetation (tree, shrub, herb, or subdivisions of them) where the cover is typically less than 5 percent absolute cover.

Sparse vegetation: Neither vascular plants nor nonvascular organisms provide a consistent structural component or play an important role in ecological processes on the site. For the desert, this is usually below 5% absolute cover in combination with an irregular uneven distribution across the landscape.

Woody plant: Any species of plant that has noticeably woody stems (e.g., shrubs and trees). It does not include herbaceous species with woody underground portions such as tubers, roots, or rhizomes.

Tree: A one-stemmed woody plant that normally grows to be greater than 5 meters tall. In some cases, trees may be multiple-stemmed following ramifying after fire or other disturbance, but the size of mature plants is typically greater than 5 meters and/or undisturbed individuals of these species are usually single-stemmed. Certain species that sometimes resemble shrubs in the study area but may be trees in other areas (e.g., *Juniperus californica*) are, out of state-wide tradition or by definition in the USNVC, called trees. It behooves one to memorize which species are "traditionally" placed in one life-form or another. We use the NRCS Plants Database to do this.

Tree-characterized vegetation: Trees are evenly distributed throughout the stand. In the Mediterranean climate margins of the desert (as in the San Gabriel, San Bernardino, Sierra Pelona, Liebre, or Tehachapi Mountains), trees typically have >10 percent cover, providing a consistent structural component. In the true desert, short trees such as *Juniperus californica*, *Pinus monophylla*, or *Yucca brevifolia* are diagnostic at <5% cover. In stands with low overall cover, evenly distributed trees with <5% cover may be the most diagnostic species, especially if they are relatively dominant, influence the distribution or population dynamics of other plant species, or play an important role in ecological processes within the stand.

Forest: In the USNVC, a forest is defined as a tree-dominated stand of vegetation with 60% or greater cover of trees. Most forest alliances tend to have an average cover of trees >60%, but individual stands under certain conditions may drop lower than 60%.

Woodland: In the USNVC, a woodland is defined as a tree-dominated stand of vegetation with between 25 and 60 percent cover of trees. Most woodland alliances tend to have average tree cover of 25%-60%, but individual stands under certain conditions may be higher or lower than this range.

Emergent: A plant (or vegetation layer) is considered emergent if it has low cover and rises above a layer which has most of the cover in the stand. For example, individual *Quercus lobata* trees may comprise an emergent tree layer of <5% over dense *Artemisia californica* in the shrub understory; the stand would be considered within the *Artemisia californica* Shrubland Alliance because the total tree cover is <5% and the shrub cover is >10%. For desert vegetation, which is inherently sparse, the threshold is lower. Trees such as *Juniperus californica*, *Pinus monophylla*, and *Yucca brevifolia* can be evenly distributed as low as 1-2% and be considered the dominant members of the canopy instead of emergent trees because the shrub or herb vegetation cover is usually low. Medium to tall shrubs are not considered emergent over shorter shrubs, but short trees are considered emergent over tall shrubs.

Joshua Tree (=Yucca brevifolia) "woodland": *Yucca brevifolia* is prominent in the Mojave Desert, as it is typically substantially taller than most other woody plants. It is considered a tree, even in its short clonal form - which is typical of the western desert margins. Even though woodlands outside of the desert are rarely considered such when the tree cover is low, a stand can be considered *Yucca brevifolia* woodland when Joshua trees are evenly distributed and have at least 1% cover.

Shrub: A multi-stemmed woody plant that usually is between 0.2-5 meters tall. Definitions are blurred at the low and high ends of the height scales. At the tall end, shrubs may approach tree size based on disturbance frequencies (e.g., old-growth re-sprouting chaparral species such as *Cercocarpus montanus*, *Fremontodendron californica*, *Prunus ilicifolia*, and so forth, may frequently attain "tree size", though we still consider them shrubs). At the short end, woody perennial herbs or subshrubs of various species are often difficult to categorize into a consistent life-form (e.g., *Artemisia dracuncululus*, *Gutierrezia sarothrae*); in such instances, we refer to the NRCS PLANTS Database (USDA, NRCS 2015) or "pick a lane" based on best available definitions.

Subshrub: A multi-stemmed plant with noticeably woody stems less than 0.5 meter tall. May be easily confused as a perennial herb or small shrub. We lump them into the "shrub" category in the summary species table for each vegetation type description.

Shrub-characterized vegetation: Shrubs, including subshrubs, are evenly distributed throughout the stand, providing a consistent (even if sparse) structural component, the stand cannot be characterized as a tree stand, and one or both of the following criteria are met: (1) shrubs influence the distribution or population dynamics of other plant species; (2) shrubs play an important role in ecological processes within the stand. Shrub alliances typically have at least 10% shrub cover – in stands with less cover, shrubs must be characteristic and have even distribution for the stand to be considered a shrub alliance.

Herbaceous plant: Any species of plant that has no main woody stem development – includes grasses, forbs, and perennial species that die back each year.

Herb-characterized vegetation: Herbs are evenly distributed throughout the stand, providing a consistent (even if sparse) structural component and play an important role in ecological processes within the stand. The stand cannot be characterized as a tree or shrub stand.

Nonvascular vegetation: Nonvascular organisms characterize a stand, providing a consistent (even if sparse) structural component and play an important role in ecological processes within the stand.

Botanical nomenclature: In vegetation mapping, we use the NRCS PLANTS Database (USDA, NRCS 2015) as our standard for botanical names. In certain cases, if a plant is recognized by *The Jepson Manual, second edition* (Baldwin et al. 2012), but not NRCS, we use the Jepson name.

Non-vegetation types (Agriculture, Urban, Water, Barren Gravel, Sand, Pastures, and Roads) are not included in the key since they were not mapped using the USNVC. Mapping standards for these types are reported in the *High Speed Rail Corridor Mapping Standards* (GIC 2014).

KEY TO NATURAL AND SEMI-NATURAL VEGETATION

Section I: Woodlands and forests dominated or characterized by needle- or scale-leaved conifer trees.

1. Vegetation dominated or characterized by *Juniperus californica* or *Pinus sabiniana*.

Californian Evergreen Coniferous Forest and Woodland Group

1a. *Pinus sabiniana* strongly dominates in the tree overstory and tree oaks are absent or strongly sub-dominant.

***Pinus sabiniana* Alliance**
Pinus sabiniana / grass Association

1b. *Juniperus californica* dominates in an open tree overstory, sometimes with understory shrubs meeting or exceeding *Juniperus* in cover. If co-occurring with *Pinus monophylla* or *Quercus john-tuckeri*, *J. californica* must have >60% relative cover to key to the juniper alliance (i.e., if *J. californica* is co-dominant with *Pinus monophylla* or *Quercus john-tuckeri*, key to one of the latter two alliances, respectively). *Artemisia tridentata*, *Ericameria* spp., *Eriogonum fasciculatum*, and/or *Purshia tridentata* may be present.

***Juniperus californica* Alliance**
Juniperus californica / *Eriogonum fasciculatum* Provisional Association
Juniperus californica / *Purshia tridentata* Provisional Association

2. *Abies concolor* dominates in the tree overstory and may mix with hardwoods and other conifers, such as *Quercus chrysolepis*, *Q. kelloggii*, *Pinus lambertiana*, and/or *P. ponderosa*. One stand, located in the hills to the northwest of Bear Valley Springs, was surveyed in the study area.

Californian Montane Conifer Forest Group

***Abies concolor* Alliance**

3. *Pinus monophylla* is the dominant tree or is co-dominant (sometimes having <5% absolute cover) with *Quercus chrysolepis*, *Q. john-tuckeri* or *Juniperus californica* in open woodlands. Understory shrubs may include *Artemisia tridentata*, *Eriogonum fasciculatum*, and *Ephedra* spp.

Western Great Basin Montane Conifer Woodland Group

***Pinus monophylla* Alliance**
Pinus monophylla – *Juniperus californica* / *Artemisia tridentata* – *Coleogyne ramosissima* Association
Pinus monophylla / *Quercus john-tuckeri* Provisional Association

Section II. Woodlands, forests, and riparian shrublands characterized mainly by native and non-native broad-leaved evergreen and deciduous trees, as well as riparian shrub species. Includes *Aesculus*, *Ailanthus*, *Baccharis*, *Celtis*, *Platanus*, *Populus*, *Salix*, *Sambucus*, *Tamarix*, and tree species of *Quercus*.

4. Woodland stands characterized by *Aesculus* or a tree species of *Quercus*. The understory herbaceous layer is often moderately dense, consisting largely of non-native grasses, with some native grasses and forbs.

Californian Broadleaf Forest and Woodland Group

4a. *Aesculus californica* is the dominant tree, or is co-dominant with *Pinus sabiniana* in the tree overstory, often over a moderately dense herbaceous layer. If tree species of *Quercus* are present, *Aesculus* must have >60% relative cover to key to this alliance. If *Aesculus* has <60% relative cover and oaks are otherwise important, key to the appropriate *Quercus* tree Alliance.

***Aesculus californica* Alliance**
Aesculus californica Association

4b. *Quercus chrysolepis* is the dominant tree or is co-dominant with *Aesculus californica*, *Quercus kelloggii*, or *Q. wislizeni* in the tree overstory. If co-occurring with *Pinus monophylla*, *Q. chrysolepis* must have >60% relative cover to key to the oak alliance (i.e., if *Q. chrysolepis* and *Pinus monophylla* are co-dominant, key to pine alliance).

***Quercus chrysolepis* tree Alliance**
Quercus chrysolepis Association
Quercus chrysolepis – *Aesculus californica* Provisional Association
Quercus chrysolepis – *Quercus kelloggii* / (*Toxicodendron diversilobum*) Association
Quercus chrysolepis – *Quercus wislizeni* Association

4c. *Quercus douglasii* (or occasionally *Quercus xalvordiana*, which is defined operationally by tree size and morphology, but with some leaf characteristics of *Q. john-tuckeri*) is the dominant tree or is co-dominant with *Pinus sabiniana* or *Aesculus californica* in an open to moderately dense overstory. Understory shrubs may include *Artemisia tridentata*, *Ceanothus cuneatus*, *Ericameria nauseosa*, *Eriogonum fasciculatum*, and *Ribes quercetorum*.

***Quercus douglasii* Alliance**
Quercus douglasii / *Ceanothus cuneatus* Association
Quercus douglasii / *Eriogonum fasciculatum* / herbaceous Association
Quercus douglasii / grass Association
Quercus douglasii – *Aesculus californica* / grass Association
Quercus douglasii – *Pinus sabiniana* / *Artemisia tridentata* Provisional Association
Quercus douglasii – *Pinus sabiniana* / *Ericameria nauseosa* Provisional Association

4d. *Quercus kelloggii* is the dominant tree in the overstory. If *Q. chrysolepis* is present and co-dominant, key to the *Quercus chrysolepis* Alliance.

***Quercus kelloggii* Alliance**

4e. *Quercus lobata* is the dominant tree or is co-dominant with *Quercus wislizeni* in upland settings. If *Q. lobata* stands are found in riparian settings, intermixing with *Salix* spp. or other riparian taxa, see step 6c below.

Quercus lobata Alliance (upland version)
Quercus lobata / grass Association
Quercus lobata – *Quercus wislizeni* Association

4f. *Quercus wislizeni* is the dominant tree or is co-dominant with *Aesculus californica*, *Quercus douglasii* and/or *Pinus sabiniana* in the overstory or *Cercocarpus montanus* in the understory. *Ceanothus cuneatus* and *Ribes quercetorum* may be present in the understory.

Quercus wislizeni tree Alliance
Quercus wislizeni – *Aesculus californica* Association
Quercus wislizeni – *Cercocarpus montanus* Association¹
Quercus wislizeni – *Quercus douglasii* – *Pinus sabiniana* / (grass) Association

5. Tree or shrub vegetation dominated by *Ailanthus*, *Eucalyptus*, or *Tamarix*, all introduced, non-native plants.

5a. Vegetation dominated by *Ailanthus* or *Eucalyptus*...

Introduced North American Mediterranean Woodland and Forest Group

5a1. *Ailanthus altissima* dominates along riparian or disturbed areas.

***Ailanthus altissima* Semi-Natural Alliance**

5a2. A species of *Eucalyptus* (e.g., *E. camaldulensis*, *E. globulus*) dominates in the tree overstory, often in riparian settings.

***Eucalyptus (globulus, camaldulensis)* Semi-Natural Alliance**

5b. *Tamarix* spp. dominates along canyons, riverbanks, or disturbed roadsides.

Southwestern North American Introduced Riparian Scrub Group

***Tamarix* spp. Semi-Natural Alliance**

6. Riparian vegetation dominated by *Platanus*, *Populus*, or *Salix laevigata* in the tree overstory.

Southwestern North American Riparian Evergreen and Deciduous Woodland Group

6a. *Platanus racemosa* is the dominant tree or co-dominates with *Populus fremontii* or *Salix laevigata* along riparian corridors. Tree species of *Quercus* may share similar cover to *Platanus* along the outer riparian edge and into the upland landscape.

***Platanus racemosa* Alliance**
Platanus racemosa – *Populus fremontii* Association

¹ The *Quercus wislizeni*–*Cercocarpus montanus* Association is technically part of the *Quercus wislizeni* shrub Alliance in the current NVCS. For this project, it was mapped as part of the *Quercus wislizeni* tree Alliance.

6b. *Populus fremontii* is the sole dominant or may be co-dominant with *Salix laevigata* or *S. gooddingii* in riparian settings.

***Populus fremontii* Alliance**
Populus fremontii – *Salix laevigata* Association

6c. *Quercus lobata* usually dominates the tree canopy in riparian settings, sometimes intermixing with *Salix laevigata* or with *S. lasiolepis* or *S. exigua* in the understory. When *Q. lobata* occurs in upland landscapes, over grass or co-dominant with *Q. wislizeni*, key to the upland version of the *Q. lobata* Alliance (see step 4e above).

***Quercus lobata* Riparian Alliance**
Quercus lobata / *Salix lasiolepis* Association

6d. *Salix laevigata* dominates the tree overstory, though *Salix lasiolepis* may meet or exceed it in cover in the understory. If *S. lasiolepis* has >60% relative cover (and trees are sub-dominant, generally with <10% absolute cover), key to the *S. lasiolepis* Alliance (step 7e below).

***Salix laevigata* Alliance**
Salix laevigata Association
Salix laevigata / *Salix lasiolepis* Association

6e. *Salix gooddingii* dominates in the tree canopy. *Salix exigua* is often present in the understory.

***Salix gooddingii* Alliance**

7. Riparian corridors or intermittent watercourses dominated by *Baccharis*, *Celtis*, *Salix lasiolepis*, or *Sambucus*.

Southwestern North American Riparian/Wash Scrub Group

7a. *Baccharis salicifolia* dominates in the shrub overstory, sometimes with patchy distribution along riparian stringers.

***Baccharis salicifolia* Alliance**
Baccharis salicifolia Association

7b. *Celtis reticulata* dominates unique stands that may be found in low valleys along riparian or upper stream terrace settings.

***Celtis reticulata* Provisional Alliance**

7c. *Forestiera pubescens* dominates in moist rocky draws or along narrow arroyos. Compared to the *Salix exigua* and *Populus fremontii* Alliances, *Forestiera pubescens* stands appear to prefer slightly drier conditions upslope from flowing water. Stands are often dense with a sparse understory.

***Forestiera pubescens* Alliance**

7d. *Salix exigua* is characteristically present as a dominant or co-dominant shrub, usually with >5% absolute cover and >50% relative cover in the shrub layer. It forms an open to continuous canopy along riparian corridors. It often forms narrow strips along major creeks and rivers and along ditches and reservoir edges. Other willow species may be present as sub-dominants with low cover, and *Baccharis salicifolia* may occasionally be co-dominant.

***Salix exigua* Alliance**

7e. *Salix lasiolepis* dominates the shrub overstory. If riparian tree species are present, they must be sub-dominant (generally <10% absolute cover), with *S. lasiolepis* having >60% relative cover.

***Salix lasiolepis* Alliance**
Salix lasiolepis Association

7f. *Sambucus nigra* dominates, often creating an open shrub overstory.

***Sambucus nigra* Alliance**

Section III. Shrub or occasional grass vegetation dominated or characterized by warm or cool semi-desert plants, including *Achnatherum (Stipa)*, *Ambrosia*, *Artemisia*, *Atriplex*, *Encelia*, *Ephedra*, *Ericameria*, *Eriogonum fasciculatum*, *Grayia*, *Larrea*, *Lepidospartum*, *Lycium*, *Prosopis*, *Prunus fasciculata*, *Purshia*, *Salazaria (Scutellaria)*, and *Yucca*. Vegetation typically found in xeromorphic settings (sometimes along desert washes) with lower overall plant cover than is found in more moderate climates.

8. Vegetation dominated or characterized by *Ambrosia*, *Atriplex polycarpa* and/or *Larrea tridentata*.

Lower Bajada and Fan Mojavean–Sonoran Desert Scrub Group

8a. *Ambrosia dumosa* dominates, though often mixes with a variety of semi-desert shrubs. If *Eriogonum fasciculatum* or *Ericameria cooperi* co-dominate, key to the *A. dumosa* Alliance. *Grayia* or *Larrea* must be clearly sub-dominant or with patchy distribution; if either plant is co-dominant and uniformly distributed, key instead to the *Grayia spinosa* or *Larrea tridentata*-*Ambrosia dumosa* Alliance.

***Ambrosia dumosa* Alliance**
Ambrosia dumosa Association

8b. *Ambrosia salsola* characterizes stands and typically has the highest cover (usually >50% relative cover in the dominant shrub layer). If *A. salsola* is co-dominant with *Eriogonum fasciculatum*, key to the *E. fasciculatum* Alliance. If *Atriplex canescens* or *Ephedra californica* co-dominate, key to the *Atriplex* and *Ephedra* Alliances (steps 11a and 10b1, respectively).

***Ambrosia salsola* Alliance**
Ambrosia salsola Association

8c. *Atriplex polycarpa* typically has the highest cover with >50% relative cover in the dominant shrub layer. Stands occur in desert wash terraces in the eastern portion of the study area and occasionally on steep, granitic rocky slopes and wash terraces in the western portion. If *Atriplex canescens* is co-dominant, key to the *A. canescens* Alliance (step 11a).

***Atriplex polycarpa* Alliance**
Atriplex polycarpa Association

8d. *Larrea tridentata* and *Ambrosia dumosa* broadly characterize a stand, with both species being evenly distributed across the landscape. In combination, the two species clearly dominate when their covers are added. However, mapping aggregations sometimes take into account mixes of *Larrea tridentata* without *Ambrosia dumosa* or *Ambrosia dumosa* without *Larrea tridentata* if they occur in fine scale patches within broader *Larrea tridentata*–*Ambrosia dumosa* stands. In the Tehachapi Pass, *Eriogonum fasciculatum* commonly co-occurs as an associated species.

***Larrea tridentata* – *Ambrosia dumosa* Alliance**
Larrea tridentata – *Ambrosia dumosa* – *Eriogonum fasciculatum* Association

8e. *Larrea tridentata* is the dominant shrub with at least 2% cover (1% cover in stands with a very sparse shrub canopy) and is evenly distributed in the stand. If present, *Ambrosia dumosa* and/or *Encelia farinosa* are clearly sub-dominant.

***Larrea tridentata* Alliance**

9. Vegetation dominated by or characterized by *Eriogonum fasciculatum* in semi-desert landscapes (usually *E. fasciculatum* var. *polifolium*), *Salazaria (Scutellaria) mexicana*, & *Yucca brevifolia*.

Mojavean Upper Desert Scrub Group

9a. *Eriogonum fasciculatum* is dominant or co-dominant with other desert shrubs present, including *Ephedra nevadensis*, *Ambrosia dumosa*, *Cylindropuntia*, *Ericameria cooperi*, *Grayia spinosa*, and *Salazaria (Scutellaria) mexicana*. Other desert-cismontane transitional species such as *Hesperoyucca*, *Encelia actoni*, or *Ephedra viridis* may be present.

***Eriogonum fasciculatum* – (*Viguiera parishii*) Provisional Alliance**
Eriogonum fasciculatum – *Ephedra nevadensis* Provisional Association

9b. *Salazaria (Scutellaria) mexicana* typically has the highest cover, though *Ephedra nevadensis* may be co-dominant.

***Salazaria (Scutellaria) mexicana* Alliance**
Salazaria (Scutellaria) mexicana Association

9c. *Yucca brevifolia* is present and evenly distributed throughout the stand, though usually only between 1 and 5% cover. Stands often have substantially higher cover of shorter shrubs or perennial grasses beneath the well-spaced emergent trees. *Yucca brevifolia* must be evenly distributed, not scattered and clumped, and must have 1% or greater absolute cover to map at the alliance level. If

Juniperus californica is present, *Yucca brevifolia* must have at least twice the cover of *Juniperus*. *Pinus monophylla* must be lower than 1% absolute cover and not evenly distributed.

***Yucca brevifolia* Alliance**

Yucca brevifolia / *Ephedra nevadensis* Association

10. Vegetation of washes, wash terraces, or concave, rocky slopes dominated by, co-dominated by, or containing evenly distributed shrubs of the following species: *Ephedra californica*, *Lepidospartum squamatum*, *Prosopis glandulosa*, or *Prunus fasciculata*.

10a. *Prosopis glandulosa* and/or *Prosopis pubescens* typically have $\geq 2\%$ absolute cover (1% in stands with sparse total canopy cover) as the dominant woody plant(s) - not exceeded in cover by any other species of microphyllous tall shrub or tree. In *P. glandulosa* stands, understory shrubs may exceed *P. glandulosa* in cover, including species such as *Atriplex canescens*, *Atriplex polycarpa*, *Larrea tridentata*, *Pluchea sericea*, and *Suaeda moquinii*. *Prosopis glandulosa* is usually associated with stabilized dunes or sand sheets adjacent to playas or basins and is mapped even if stands have very low vegetative cover, especially if there is evidence of recent die-off due to dewatering via ground pumping, etc. Due to similar ecology and sporadic occurrence as a type, *Prosopis pubescens* is treated in the *P. glandulosa* Alliance. Furthermore, *P. pubescens* is associated with stands of the usually more abundant *P. glandulosa*.

Sonoran-Coloradan Semi-Desert Wash Woodland/Scrub Group

***Prosopis glandulosa* Alliance**

10b. *Ephedra californica*, *Lepidospartum squamatum*, or *Prunus fasciculata* characterizes the shrub overstory.

Mojavean Semi-Desert Wash Scrub Group

10b1. *Ephedra californica* is dominant or may be co-dominant with *Ambrosia salsola* or *Hesperoyucca whipplei*. *Ephedra californica* is typical of broad, active washes of middle to upper bajadas and fans, but may be found on rocky slopes in drainages.

***Ephedra californica* Alliance**

10b2. *Lepidospartum squamatum* dominates or characterizes open stands with a variety of native and non-native herbs in the understory, in either desert or cismontane settings. Stands are concentrated along washes - usually larger washes with regular flooding where the substrate texture is coarse sand to small cobbles to gravel.

***Lepidospartum squamatum* Alliance**

Lepidospartum squamatum / *Amsinckia menziesii* Association

Lepidospartum squamatum / ephemeral annuals Association

10b3. *Prunus fasciculata* is the dominant species, or may be co-dominant with *Artemisia tridentata* or *Ribes quercetorum*. The alliance is typically found along washes and arroyos but

may occur on terraces or concave slopes in the eastern portion of the study area. Cover may be high following re-sprouting from fire.

***Prunus fasciculata* Alliance**
Prunus fasciculata Association

11. Vegetation dominated by *Atriplex canescens* or *Artemisia tridentata*.

11a. *Atriplex canescens* characterizes stands, typically with the highest shrub cover, though *Ambrosia salsola* and *Atriplex polycarpa* may have similar or slightly higher cover. Stands may have emergent *Yucca brevifolia*. Found in sandy, often disturbed areas on lower slopes and in valleys or along washes and roadsides.

Shadscale-Saltbush Cool Semi-Desert Scrub Group

***Atriplex canescens* Alliance**

11b. *Artemisia tridentata* is the dominant shrub or may be co-dominant with *Ericameria nauseosa* or *Eriogonum fasciculatum*. Stands with co-dominance of *Prunus fasciculata* or *Ephedra viridis* key to *Prunus* or *Ephedra*, respectively. Stands with >2% cover and even distribution of *Juniperus californica* or *Yucca brevifolia* (regardless of height) key to *Juniperus* or *Yucca*, respectively.

Inter-Mountain West Mesic Tall Sagebrush Shrubland and Steppe Group

***Artemisia tridentata* Alliance**

Artemisia tridentata – *Ericameria nauseosa* Association

12. Vegetation dominated by taxa that are relatively small and/or short-lived plants that colonize uplands following natural or unnatural disturbance such as clearing or fire, including *Encelia*, *Ericameria*, or *Gutierrezia*.

Intermontane Seral Shrubland Group

12a. *Encelia virginensis* has $\geq 2\%$ cover and no other shrub species with greater or equal cover. In the borders of the Transverse and Tehachapi ranges, stands often occur on steep, south-facing slopes associated with *Hesperoyucca whipplei* or *Eriogonum fasciculatum*. Stands may have relatively high cover of *Achnatherum (Stipa) speciosum* and *Salazaria (Scutellaria) mexicana*.

***Encelia (actoni, virginensis)* Alliance**

Encelia virginensis Association

12b. *Ericameria cooperi* is evenly distributed and dominant across the landscape (stands may be too small to map). Stands show evidence of recent disturbance (typically fire) and are usually adjacent to stands with larger and longer-lived shrubs that are more easily keyed to *Grayia spinosa*, *Ericameria teretifolia* or *Larrea tridentata* – *Ambrosia dumosa*. This type is provisional based on *E. cooperi* having a significant presence (generally >40% relative cover) in a stand. This alliance is unusual and most stands with co-dominant *E. cooperi* can be better placed in the *Ambrosia dumosa*, *Grayia spinosa*, or *Ambrosia salsola* alliances. Stands with co-dominant *E. nauseosa* or *E. teretifolia*

usually key to those alliances, respectively. *E. cooperi* is spring-flowering and a shorter-lived species that is more of a disturbance responder than *Ericameria teretifolia*.

***Ericameria cooperi* Provisional Alliance**

12c. *Ericameria nauseosa* typically dominates the shrub overstory. If *E. nauseosa* is co-dominant with *Eriogonum fasciculatum*, key to the *E. fasciculatum* Alliance. If present, *Juniperus californica* has trace cover. Several subspecies are included in this type (e.g., *E. nauseosa* var. *mohavensis* in the cismontane or desert sides of the study area, or *E. nauseosa* var. *hololeuca* in some semi-riparian stands towards the eastern side).

***Ericameria nauseosa* Alliance**

12d. Stands with *Ericameria teretifolia* $\geq 2\%$ absolute cover (<2% cover in stands with a very sparse shrub layer). *Ericameria teretifolia* typically has the highest cover, but may share dominance with *Eriogonum fasciculatum* or *Gutierrezia*. Found in disturbed uplands in the mid-elevations, but also occurs in longer-persistent stands on shallow granitic pediments and rock outcrops. Stands may occupy shallow, rocky, post-fire settings near adjacent *Juniperus californica* or other upland alliances. When co-dominant with *Grayia*, *Ephedra nevadensis*, *E. viridis*, *Coleogyne*, or *Salazaria* (*Scutellaria*), key to those alliances.

***Ericameria teretifolia* Alliance**

Ericameria teretifolia Association

12e. *Gutierrezia sarothrae* is locally dominant on loose substrates such as gravelly washes, and on steep rocky slopes with unstable surfaces. Cover of *G. sarothrae* is higher than any other shrub.

***Gutierrezia sarothrae* Provisional Alliance**

13. Stands with diagnostic species such as *Grayia*, *Ephedra nevadensis*, *E. viridis*, and *Lycium*. These vegetation types merge with the upper edge of the *Larrea tridentata* – *Ambrosia dumosa* belt and are usually seen on north-facing slopes at lower elevations.

Intermontane Deep or Well-drained Soil Scrub Group

13a. *Ephedra nevadensis* >2% cover and no other species with greater cover. Often found on steep, mid or upper desert-facing slopes. May have sub-dominant *Salazaria* (*Scutellaria*), *Eriogonum fasciculatum*, *Ericameria* spp., and/or emergent *Yucca brevifolia*. If *Eriogonum fasciculatum* is co-dominant with *E. nevadensis*, key to the *Eriogonum fasciculatum*-(*Viguiera parishii*) Alliance (see step 9a).

***Ephedra nevadensis* Alliance**

Ephedra nevadensis – *Salazaria* (*Scutellaria*) *mexicana* Association

13b. *Ephedra viridis* $\geq 2\%$ cover as the dominant shrub or co-dominant with other shrubs such as *Artemisia tridentata*, *Ericameria teretifolia*, *Grayia spinosa*, *Salazaria (Scutellaria) mexicana*, *Krascheninnikovia lanata*, *Ericameria cuneatus*, or *Eriogonum fasciculatum*. Associated with steep talus or rock outcrops except at the highest elevations, when it can occur on more moderate slopes.

***Ephedra viridis* Alliance**

13c. *Grayia spinosa* usually $\geq 2\%$ absolute cover ($< 2\%$ in stands with a very sparse total shrub cover), evenly distributed, and no other species with substantially greater cover. Co-dominance is the rule with *Grayia* stands since they are rarely strongly monospecifically dominant. Thus, careful assessment of shrub dispersion is important for proper identification. In many cases stands have been affected by fire, clearing, grazing, or other disturbances. There are many post-fire seral stands that have strong mixtures of multiple species, but if *G. spinosa* is evenly distributed in such stands they key to *G. spinosa*. If *Ephedra viridis* is present at $\geq 2\%$ cover and evenly distributed, please see *E. viridis* Alliance.

***Grayia spinosa* Alliance**

Grayia spinosa – *Larrea tridentata* Association

13d. *Lycium andersonii* is strongly dominant without high cover of other alliance indicators such as *Salazaria (Scutellaria)*, *Grayia*, *Ephedra nevadensis*, or *Eriogonum fasciculatum*.

***Lycium andersonii* Alliance**

Lycium andersonii Provisional Association

14. Vegetation dominated by *Purshia tridentata* in the shrub layer or *Achnatherum (Stipa) speciosum* in the herbaceous layer.

14a. *Purshia tridentata* has $\geq 2\%$ absolute cover and often has higher relative cover than any other single shrub. If *Artemisia tridentata* or *Ephedra viridis* are present, they are clearly sub-dominant.

Intermountain Shallow/Calcareous Soil Scrub Group

***Purshia tridentata* Alliance**

14b. *Achnatherum (Stipa) speciosum* is dominant, with no shrubs comprising more than 10% relative cover and none evenly distributed across the stand. Stands are the result of fire eliminating desert shrub cover from stands that were formerly *Coleogyne ramosissima*, *Larrea tridentata* – *Ambrosia dumosa*, *Atriplex canescens*, etc.

Southern Great Basin Semi-desert Grassland Group

***Achnatherum (Stipa) speciosum* Alliance**

Achnatherum (Stipa) speciosum Association

Section IV. Vegetation dominated or characterized primarily by native species and found higher in the mountains or more strictly associated with cooler and moist to wet microsites. Shrub stands are dominated by *Rhus trilobata*, *Ribes*, *Toxicodendron*, or *Quercus john-tuckeri*. Herbaceous stands are dominated or characterized by *Carex*, *Distichlis*, *Eleocharis*, *Frankenia*, *Juncus*, *Leymus*, *Mimulus*, *Persicaria*, *Poa*, *Schoenoplectus*, or *Xanthium*.

15. Stands dominated by winter or coastal deciduous shrubs.

15a. *Toxicodendron* strongly dominates in the shrub canopy.

Vancouverian Coastal Deciduous Scrub Group

***Toxicodendron diversilobum* Alliance**
Toxicodendron diversilobum / herbaceous Association

15b. *Prunus virginiana*, *Ribes*, or *Rhus* dominates in the shrub canopy.

Western Cordilleran Montane Deciduous Scrub Group

15b1. *Prunus virginiana* dominates on steep, rocky lower slopes with some shade protection. Stands are often adjacent to creeks.

***Prunus virginiana* Provisional Alliance**

15b2. *Ribes quercetorum* is the dominant shrub in the canopy, often growing clonally in stands that have resprouted recently after fire on steep or concave north-facing slopes. If *Prunus fasciculata* is co-dominant, key to that alliance. Stands are often too small to map.

***Ribes quercetorum* Provisional Alliance**
Ribes quercetorum Provisional Association

15b3. *Rhus trilobata* dominates in the shrub overstory.

***Rhus trilobata* Provisional Alliance**

16. *Quercus john-tuckeri* is dominant or co-dominant with *Juniperus californica* (*Q. john-tuckeri* is recognized as a shrub in the USNVC, while *J. californica* is recognized as a tree, but both species often share similar stature and height). *Pinus monophylla* and/or *P. sabiniana* are often present with lower cover than *Quercus*. *Cercocarpus*, *Ephedra*, *Ericameria linearifolia*, *Eriogonum fasciculatum* and other shrubs may be found in the understory.

Western Mojave and Western Sonoran Desert Borderland Chaparral Group

***Quercus john-tuckeri* Alliance**
Quercus john-tuckeri / *Pinus monophylla* – *Pinus sabiniana* Provisional Association
Quercus john-tuckeri / *Juniperus californica* / *Ericameria linearifolia* Association

17. *Ceanothus greggii* dominates or co-dominates with *Adenostoma fasciculatum* in the shrub overstory.

Mogollan Rim Chaparral Group

***Ceanothus greggii* Alliance**

18. Stands dominated or characterized by tall to short grasses, graminoids, or forbs, and restricted to freshwater seeps, marshes, wet meadows, seasonal ponds or in regularly to episodically flooded bottomlands or depressions (including saline and alkaline depressions such as playas). Due to the proximity of fresh and saline or alkaline water sources in the study area, it is possible for freshwater and salt or alkaline stands to be immediately adjacent to one another. Most stands are small, although some meet MMU requirements and have been mapped. Dominant or characteristic taxa include *Carex*, *Distichlis*, *Eleocharis*, *Frankenia*, *Juncus*, *Leymus*, *Mimulus*, *Poa*, *Schoenoplectus*, *Persicaria* or *Xanthium*.

18a. Vegetation dominated or characterized by *Distichlis*, *Eleocharis rostellata*, *Frankenia*, *Poa*, *Persicaria*, or *Xanthium*.

18a1. *Distichlis spicata* is typically dominant or co-dominant in the herb layer, though non-native herbs may be present with moderately higher cover. Soils are often deep, alkaline or saline, and poorly drained.

Temperate Pacific Tidal Salt and Brackish Meadow Group

***Distichlis spicata* Alliance**

Distichlis spicata – annual grasses Association

18a2. *Eleocharis rostellata* is dominant to co-dominant with other wetland herbs such as *Juncus arcticus* (*E. rostellata* is usually identifiable by somewhat narrow stems and recurving fruiting branches).

Southwestern North American Alkali Marsh/Seep Vegetation Group

***Eleocharis rostellata* Provisional Alliance**

Eleocharis rostellata Provisional Association

18a3. *Frankenia salina* is dominant or co-dominant (>30% relative cover) in playas, alkaline depressions and alkali sinks that have seasonally moist, poorly drained soils. *Atriplex* spp., *Cressa truxillensis* and other alkali-tolerant species may be present.

Southwestern North American Salt Basin and High Marsh Group

***Frankenia salina* Alliance**

Frankenia salina Association

18a4. *Poa secunda*, a perennial upland grass, is dominant or co-dominant with non-native annual grasses, such as *Bromus* spp. If *Eschscholzia* is seen in air photos, always label as *Eschscholzia*, but in other areas that have high natives and no obvious wildflower fields, one might expect this alliance.

Western Dry Upland Perennial Grassland Group

***Poa secunda* Alliance**

Poa secunda ssp. *secunda* Association

18a5. *Xanthium* and/or *Persicaria* characterize stands, though a number of naturalized species, such as *Polypogon monspeliensis*, *Apium graveolens*, and *Veronica* spp. may be present with significant cover.

Naturalized Warm-Temperate Riparian and Wetland Group

***Persicaria lapathifolia* – *Xanthium strumarium* Provisional Alliance**

18b. Vegetation is dominated by or characterized by *Carex densa*, *Juncus arcticus*, *Leymus triticoides*, or *Mimulus guttatus*.

Californian Warm Temperate Marsh/Seep Group

18b1. *Carex densa* is the dominant herb or is co-dominant with *Muhlenbergia asperifolia*. Other herbs, such as *Euthamia occidentalis* may intermix.

***Carex densa* Provisional Alliance**

18b2. *Juncus arcticus* (usually termed var. *mexicanus* or var. *balticus*), the dark brownish-green rhizomatous rush, is dominant and characteristic. Stands may include similar to lower cover of other native and non-native herbs (e.g., *Distichlis spicata*, *Euthamia occidentalis*, *Leymus triticoides*, *Acroptilon repens*) but *J. arcticus* is prevalent throughout. If *Eleocharis rostellata* is co-dominant, key to the *E. rostellata* Alliance.

***Juncus arcticus* (var. *balticus*, *mexicanus*) Alliance**

Juncus arcticus var. *balticus* – *Carex praegracilis* Association

18b3. *Leymus triticoides*, the pale green creeping grass, dominates or characterizes stands. Stands are usually too small to map and often occur adjacent to edges of wetlands or riparian areas, in alkaline, saline or freshwater settings. If *Juncus arcticus* is co-dominant and/or with more even distribution, key to *J. arcticus*.

***Leymus triticoides* Alliance**

Leymus triticoides Association

18b4. *Mimulus guttatus*, the yellow-flowered annual forb, characterizes small stands found in or near seeps, springs or creeks. Other herbaceous species, such as *Urtica dioica*, that are not recognized as alliances may be present with higher cover, but *M. guttatus* is diagnostic.

***Mimulus guttatus* Alliance**
Mimulus guttatus Association

18c. Vegetation is dominated by tall emergent perennial herbs such as species of *Schoenoplectus* and *Typha* found in permanently wet soil or standing water.

Arid West Freshwater Emergent Marsh Group

18c1. *Schoenoplectus acutus*, the tall, emergent tule, dominates where ponds and sluggish, permanently flowing water exist.

***Schoenoplectus acutus* Alliance**
Schoenoplectus acutus Association

18c2. A species of *Typha* dominates in the tall herb layer.

***Typha (angustifolia, domingensis, latifolia)* Alliance**

18d. Vegetation dominated by a mosaic of vernal pools and adjacent upland grasslands adapted to seasonally moist conditions. Species include native and non-native grasses, forbs, and cryptogamic taxa. Vernal pools associated with this type occupy flat to gradually sloping terrain and are most easily visible in early to mid spring.

California Vernal Pool and Grassland Matrix Mapping Unit

Section V. Vegetation defined by growth strategies driven by a Mediterranean climate and characterized by dry summers and mild, humid, sometimes rainy winters. Sclerophyllous shrub growth forms prevail, but drought-deciduous and herbaceous forms may also occur. Enough winter moisture affords persisting stands of non-desert chaparral, coastal scrub, and grasslands. Chaparral stands are dominated or characterized by *Ceanothus*, *Cercocarpus*, and *Quercus wislizeni*, while in coastal scrub stands, *Corethrogyne*, *Ericameria*, *Eriogonum*, *Gutierrezia*, *Hesperoyucca*, or *Isocoma* are dominant or diagnostic. Herbaceous stands are dominated or characterized by *Amsinckia*, *Artemisia dracunculoides*, *Centaurea*, *Holocarpha*, *Lasthenia*, *Phacelia*, *Plantago*, or *Vulpia*.

19. Shrubby sclerophylls (i.e., chaparral) dominate in the overstory; indicator taxa include *Arctostaphylos viscida*, *Ceanothus*, *Cercocarpus*, and *Quercus wislizeni*.

19a. *Arctostaphylos viscida* or *Ceanothus cuneatus* dominates in the shrub canopy, often on well-drained soils in full sun exposures, including upper slopes, spur-ridges and convexities.

Californian Xeric Chaparral Group

19a1. *Arctostaphylos viscida* dominates in the shrub canopy.

***Arctostaphylos viscida* Alliance**

19a2. *Ceanothus cuneatus* dominates in the shrub canopy. Sub-dominant and emergent trees or shrubs such as *Quercus douglasii*, *Q. john-tuckeri*, *Q. wislizeni*, and *Pinus sabiniana* may be present.

***Ceanothus cuneatus* Alliance**
Ceanothus cuneatus Association

19b. Stands are generally in environments that are either moister or have cooler winters than the previous group. *Ceanothus leucodermis* dominates, sometimes with resprouts of *Aesculus* and *Quercus wislizeni* after fire disturbance. *Cercocarpus* may intermix as a sub-dominant.

Californian Pre-montane Chaparral Group

***Ceanothus leucodermis* Alliance**
Ceanothus leucodermis Association

19c. *Cercocarpus montanus* dominates, often with an open shrub canopy and emergent *Juniperus californica*, *Pinus monophylla*, and/or *Pinus sabiniana*. *Artemisia tridentata*, *Arctostaphylos viscida*, and *Eriogonum fasciculatum* are some of the shrubs that may intermix.

Californian Mesic Chaparral Group

***Cercocarpus montanus (betuloides)* Alliance**
Cercocarpus montanus (betuloides) / *Juniperus californica* Association
Cercocarpus montanus (betuloides) – *Eriogonum fasciculatum* Association

20. Stands are dominated by drought-deciduous shrubs, though at times they can have characteristic (constant but not dominant) resprouting, deep-rooted, sclerophyllous shrubs. Stands include mixed coastal shrublands from central California south into Baja, Mexico. The most predominant shrubs include *Eriogonum fasciculatum*, *Eriogonum wrightii*, and *Hesperoyucca whipplei*. On recently disturbed sites, such as after fire, *Corethrogyne filaginifolia*, *Ericameria linearifolia*, *Gutierrezia californica*, *Isocoma acradenia*, *Peritoma (Isomeris) arborea*, and *Lupinus albifrons* can be dominant. Note: when *Eriogonum fasciculatum* co-occurs with desert species in cool and warm semi-desert scrub, key to the *Eriogonum fasciculatum*-(*Viguiera parishii*) Alliance (see step 9a).

20a. Stands are usually open and/or display recent evidence of fire or other disturbance. The following species are either dominant or diagnostic: *Corethrogyne filaginifolia*, *Ericameria linearifolia*, *Gutierrezia californica*, *Isocoma acradenia*, *Peritoma arborea*, and *Lupinus albifrons*.

Central and South Coastal California Seral Scrub Group

20a1. *Corethrogyne filaginifolia* characterizes stands, usually having the highest cover in recently burned margins of chaparral or coastal sage scrub. Understory herbs, such as *Amsinckia*, *Bromus*

spp., and *Poa* may exceed *C. filaginifolia* in cover, while regenerating shrubs may intermix as sub-dominants.

***Corethrogyne filaginifolia* Provisional Alliance**

20a2. *Ericameria linearifolia* or *Peritoma (Isomeris) arborea* is dominant to co-dominant in the shrub canopy. Only one of the two species needs to be diagnostic to key to this alliance.

***Ericameria linearifolia* – *Peritoma arborea* Alliance**

Peritoma arborea Provisional Association

20a3. The short shrub *Gutierrezia californica* dominates an open shrub canopy, and other shrubs may be sub-dominant. The herb layer is usually well-developed, including natives and non-natives.

***Gutierrezia californica* Provisional Alliance**

Gutierrezia californica / annual – perennial grass – herb Provisional Association

20a4. *Isocoma acradenia* dominates an open shrub canopy, and other shrubs may be sub-dominant. The herb layer is usually well-developed, including natives and non-natives.

***Isocoma acradenia* Provisional Alliance**

Isocoma acradenia Provisional Association

20a5. *Lotus scoparius* (= *Acmispon glaber*) dominates or characterizes stands that are often open and/or display evidence of recent fire or other disturbance.

***Lotus scoparius* Alliance**

20a6. *Lupinus albifrons* dominates in the shrub canopy and grows on slopes that may be disturbed, steep, and unstable.

***Lupinus albifrons* Alliance**

20b. Stands are characterized by the presence of *Eriogonum fasciculatum*, *E. wrightii* or *Hesperoyucca whipplei*, without significant cover of the previous group of seral scrubs.

Central and South Coastal Californian Coastal Sage Scrub Group

20b1. *Hesperoyucca whipplei* is the sole dominant or may be co-dominant with semi-desert shrubs such as *Atriplex polycarpa* or *Ephedra* spp. *Eriogonum fasciculatum* is noticeably absent from these stands; if *E. fasciculatum* has a minor to significant presence, key to the *Eriogonum fasciculatum* Alliance.

***Hesperoyucca whipplei* Provisional Alliance**

20b2. *Eriogonum fasciculatum* is typically $\geq 2\%$ absolute cover or $> 50\%$ relative cover in the shrub canopy, but read full description for exceptions. Most pure stands occur along the east

face of the Tehachapi and Scodie Mountains. These stands tend to have substantially higher shrub cover and usually do not co-dominate with many species. In the desert hills and mountains >1000m (3000ft) elevation, *Eriogonum fasciculatum* co-occurs with many other semi-desert shrubs; if *Ambrosia dumosa*, *Artemisia tridentata*, *Ephedra viridis*, *Ericameria teretifolia*, *Purshia tridentata*, or *Ericameria linearifolia* are equal or higher in cover, key stands to those alliances. *Ambrosia salsola*, *Ericameria nauseosa* or *Hesperoyucca whipplei* may have higher cover than *E. fasciculatum* and still be in the *E. fasciculatum* Alliance. [Note: see step 9a to contrast this alliance with the desert expression of *E. fasciculatum*, the *E. fasciculatum*-(*Viguiera parishii*) Alliance].

***Eriogonum fasciculatum* Alliance**
Eriogonum fasciculatum Association
Eriogonum fasciculatum var. *foliolosum* – *Hesperoyucca whipplei* Association

20b3. *Eriogonum wrightii* is dominant. Associated species may include *Artemisia tridentata*, *Eriogonum fasciculatum*, and *Ericameria linearifolia*.

***Eriogonum wrightii* Alliance**

20c. Vegetation characterized by native and non-native grasses and herbs adapted to Mediterranean climates. Shrubs, if present, are not >10% absolute cover and/or not evenly distributed across a stand.

California Annual and Perennial Grassland Macrogroup

20c1. Stands are dominated or characterized by mostly annual grasses and forbs. Native herbs are characteristic and evenly distributed across the herbaceous layer, though non-native forbs and grasses may be dominant. Cover and composition vary year to year, but indicators are usually present in sufficient amounts to differentiate from non-native stands. Diagnostic species include *Amsinckia* spp., *Artemisia dracuncululus*, *Eschscholzia* spp., *Holocarpha* spp., *Lasthenia* spp., *Phacelia* spp., *Plantago erecta* and *Vulpia microstachys*.

California Annual Forb/Grass Vegetation Group

20c1i. *Amsinckia menziesii*, *A. tessellata*, *A. vernicosa*, or *Phacelia* spp. (e.g., *Phacelia affinis* or *P. cicutaria*) are seasonally characteristic in the herbaceous layer, sometimes with non-natives having the dominant cover. Soils are often well-drained and loamy and may have high levels of bioturbation (e.g., rodent burrows) and/or high levels of past or current grazing.

Amsinckia (menziesii, tessellata) Alliance
Phacelia spp. Provisional Association

20c1ii. *Artemisia dracuncululus* dominates in the shrub/subshrub overstory. A variety of native herbs may intermix in the understory during spring, such as *Achillea*, *Clarkia*, *Claytonia* and others.

***Artemisia dracuncululus* Alliance**

20c1iii. *Eschscholzia californica* is seasonally dominant on upland slopes or flats with well-drained sandy to loamy soils. *Amsinckia*, *Avena*, *Bromus*, *Castilleja exserta*, *Erodium cicutarium*, *Lupinus bicolor*, *Lupinus microcarpus*, *Uropappus lindleyi* and a variety of other native and non-native forbs and grasses may be present.

Eschscholzia (californica) Alliance

20c1iv. *Holocarpha* (most likely *H. heermannii* in the study area) is seasonally characteristic in the herbaceous layer in late spring/early summer - often with non-natives having the dominant cover, but with some presence of natives (e.g., *Amsinckia*, *Eschscholzia*, *Chamaesyce*, *Lupinus bicolor*, *Plagiobothrys*, etc.). Stands may occur on granitic outcrops or grassy slopes.

Holocarpha (heermannii, virgata) Provisional Alliance

Holocarpha heermannii Provisional Association

20c1v. *Lasthenia californica*, *L. gracilis*, *Plantago erecta*, and/or *Vulpia microstachys* are characteristically present in herbaceous stands. A variety of native forbs including *Lepidium nitidum*, *Plagiobothrys* spp., and *Trifolium* spp. may be present.

Lasthenia californica – Plantago erecta – Vulpia microstachys Alliance

20c2. Stands are strongly dominated by non-natives and lack evenly distributed, diagnostic native plants (usually <5% relative cover). Annual *Avena*, *Bromus*, *Schismus*, *Brassica* and other non-native herbaceous taxa are strongly dominant. Because very few surveys were collected in non-native stands for this project, most polygons will be mapped broadly at the Group Level.

Mediterranean California Naturalized Annual and Perennial Grassland Group

Centaurea (virgata) Provisional Semi-Natural Alliance

Acroptilon repens Provisional Semi-Natural Association

Section VI. Sparsely vegetated outcrops and other settings where vegetation is limited by the lithic nature of the substrate. Vegetation is often largely absent and not uniformly distributed across a landscape surface, not composed of evenly-spaced trees or shrubs, or not characterized by herbaceous species most of the time. In the study area, stands are characterized by *Selaginella bigelovii* or *Eriogonum inflatum*.

21. *Selaginella bigelovii* grows on soil on steep, colluvial slopes or along crevices and ledges within granitic outcrops. Cover of *Selaginella* may be relatively high on soil surfaces, but is trace when found in rocky outcrops. Lichens and mosses can dominate on rock faces, while vascular plants may be found in low cover in interstitial openings.

Central California Coast Ranges Cliff and Canyon Group

Selaginella bigelovii Alliance

22. *Eriogonum inflatum* dominates the herbaceous layer. In the study area, stands were observed along open swales, between stands of *Juniperus californica* and/or *Ericameria nauseosa*. Stands may be too small to map.

North American Warm Desert Bedrock Cliff and Outcrop Group

***Eriogonum (clavatum, inflatum)* Provisional Alliance**

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