

10980

California Montane Woodland and Chaparral

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Vegetation Type

Shrubland

Map Zones

4

Geographic Range

Montane chaparral is located from the Southern Cascades, through the Sierra Nevada, the Peninsular and Transverse Ranges and into Baja California.

Biophysical Site Description

Primarily occurs at elevations where much of the precipitation occurs as snowfall from 4,500-8,000ft. In smaller patches it can occur at lower elevations at 1,500-5,000ft. These locations are commonly on steep, exposed slopes with rocky or shallow soils, favoring south and west aspects in canyons and other areas with low site productivity/shallow soils.

Vegetation Description

These are mosaics of woodlands with chaparral understories, shrub-dominated chaparral, or short-lived chaparrals with conifer species invading if good seed source is available. Shrubs will often have higher densities than the trees, which are more limited due to the rocky/thin soils. These can also be short duration chaparrals in previously forested areas that have experienced crown fires. Trees tend to have a scattered open canopy or can be clustered over a usually continuous dense shrub layer. Typical *sclerophyllous* chaparral shrubs include *Arctostaphylos nevadensis*, *A. patula*, *A. glandulosa*, *A. pringlei*, *Ceanothus cordulatus*, *C. integerrimus*, *Quercus wislizeni frutescens*, and *Chrysolepis sempervirens* (= *Castanopsis sempervirens*). Some stands can be dominated by winter deciduous shrubs such as *Prunus emarginata*, *Prunus virginiana*, *Ceanothus integerrimus*, *Holodiscus discolor*, *Holodiscus microphyllus*, and *Quercus garryana*. Most chaparral species are fire-adapted, resprouting vigorously after burning or producing fire-cued seeds. Occurrences of this system likely shift across montane forested landscapes with catastrophic fire events. Conifers (*Pinus jeffreyi*, *Abies concolor*, *Abies magnifica*, *Pinus monticola*, *Pinus lambertiana*, *Pinus coulteri*, and *Pinus attenuate*) may be present but are generally scattered due to the competitive advantage and crown fire regimes of the surrounding chaparral. Hardwoods also present include *Quercus chrysolepis* and *Quercus kelloggii*.

A reviewer felt that the term “fire-sensitive” better described chaparral than “fire-adapted.” Reviewer stated that labeling chaparral as fire-adapted suggests they need fire to survive. This is

not true except in extremely limited situations. It is better to label chaparral species as “fire regime-sensitive,” meaning they require particular fire regimes in order to successfully continue populating a site. So-called “fire-adapted” species should not be able to be eliminated by fire, but in fact many chaparral species are due to increased fire frequencies or out-of-season burns.

BpS Dominant and Indicator Species

Symbol	Scientific Name	Common Name
PICO3	<i>Pinus coulteri</i>	Coulter pine
ABCO	<i>Abies concolor</i>	White fir
QUCH2	<i>Quercus chrysolepis</i>	Canyon live oak
QUKE	<i>Quercus kelloggii</i>	California black oak
CECO	<i>Ceanothus cordulatus</i>	Whitethorn ceanothus
CEIN3	<i>Ceanothus integerrimus</i>	Deerbrush
ARPR	<i>Arctostaphylos pringlei</i>	Pringle manzanita
ARGL3	<i>Arctostaphylos glandulosa</i>	Eastwood's manzanita

Species names are from the NRCS PLANTS database. Check species codes at <http://plants.usda.gov>.

Disturbance Description

Stand-replacing fires occur mostly in the shrub-dominated stages. In the conifer-dominated late-seral-closed stage, surface fire is also important. Mean fire return interval is generally greater than that of the surrounding forested landscape (including the lower elevation California Mesic Chaparral, biophysical setting [BpS] 1097), and perhaps double (Nagel and Taylor, in press), due to the lack of flammability of many young shrub fields without a long history of fuel accumulation.

Fire Frequency

Severity	Avg FI	Percent of All Fires	Min FI	Max FI
Replacement	57	68		
Moderate (Mixed)	119	32		
Low (Surface)				
All Fires	39	100		

Fire interval is expressed in years for each fire severity class and for all types of fire combined (All Fires). Average FI is the central tendency modeled. Percent of all fires is the percent of all fires modeled in that severity class. Minimum and Maximum FIs show the relative range of fire intervals as estimated by model contributors, if known.

Scale Description

Montane chaparral typically originates following large stand-replacing fires in conifer forests. A variety of montane shrubs occupy the site and limit establishment and growth of conifers. If these shrublands burn again before succession to late-seral-closed forest, they can stay shrub dominated for long periods of time (centuries). Patch size can be large, especially in the northern part of the state.

Adjacency or Identification Concerns

This includes several types of montane shrublands on sites that are typically seral to conifers. Montane chaparral is usually embedded within mixed conifer, red fir, white fir, Jeffrey pine, and other conifer forests on sites that are prone to stand-replacing fire, or on otherwise disturbed or more open sites.

Issues or Problems

Not sure about historic composition of seral stages. System described over broad area on east and west side of Sierras. It also occurs elsewhere; however, most literature summarized is characteristic of the Sierra Nevada range.

There was considerable discussion among experts about how this type should be described. There was general agreement that this type should represent montane chaparral and not montane chaparral and woodland. The Rapid Assessment regional lead modified the description to emphasize montane chaparral but was unable to get a second review for this type.

Initial discussions about this type indicated that although it is broadly defined and may warrant splitting into two, mapping them separately may not be possible. Evens indicated that if this type were to be split, it could be divided into 1) montane shrub species with regular fire as currently written, and 2) a higher-elevation type that is not regularly burned. The higher-elevation type would include *Chrysolepis sempervirens* and *Arctostaphylos patula* among other species. However, there may not be sufficient data to inform this split. It is not clear how different the fire intervals are for these two types. Keeley stated that a better way to visualize the dynamics of this system is of a montane system that is stable over long periods of time due to edaphic conditions unfavorable to forests. After crown fires in adjacent forests, the seeding species of *Arctostaphylos* and *Ceanothus* can colonize these sites and establish seed banks that can persist until another crown fire. Thus, there is the serial form of this community that is dominated by seeding species and the equilibrium community that is much more diverse. Minnich noted that as written this type includes montane chaparral and low-elevation chamise and mixed chaparral. The response of these two assemblages to fire is highly divergent and this type should be split into two. Safford indicated that, as written, this model is only applicable where chaparral is not seral to conifers (where this type would simply represent pathways within a conifer model); therefore, including a late-seral conifer-dominated stage in this model may not be appropriate. These comments should be reevaluated for future revisions to this model.

Also, as originally described, this type included several *Cupressus* species (*Cupressus forbesii*, *Cupressus arizonica* ssp. *Stephensonii*, and *Cupressus arizonica* ssp. *Nevadensis*) that were included in the NatureServe description. All experts agreed that these species did not belong in this type as described for LANDFIRE, so the regional lead removed all reference to these species. These species are listed as part of the California Xeric Serpentine Chaparral system (BpS 1099).

Native Uncharacteristic Conditions

Shrub canopy closure in Class A won't exceed 70%, but in later stages it could. Trees overtop the shrubs in classes B and C. The mid-open stands will have at least 10%, but not more than 50% canopy closure of trees. The range of canopy closure for trees in class C will exceed 20%, but less than 80%. Class C could also include canopy closure up to 80% of trees <25m. Shrub canopy closure for classes B and C is in the range of 40-90%. Tree canopy closure >80% would be uncharacteristic.

Comments

Hugh Safford (hughsafford@fs.fed.us) and Dave Schmidt also reviewed this model for map zones (MZ)s 4 and 5.

Experts in MZs 4 and 5 felt that this type would more appropriately be called California Montane Chaparral. Although this type can have scattered conifers, montane chaparral is a distinct system all by itself.

Succession Classes

Mapping Rules

Upper Layer Lifeform	Height (m)	Canopy Cover (%)									
		0-10	11-20	21-30	31-40	41 - 50	51-60	61-70	71-80	81-90	91-100
Herb	0-0.5	A	A	A	A	A	A	A	A	A	A
Herb	0.5-1.0	A	A	A	A	A	A	A	A	A	A
Herb	>1.0	A	A	A	A	A	A	A	A	A	A
Shrub	0-0.5	A	A	A	A	A	A	A	UN	UN	UN
Shrub	0.5-1.0	A	A	A	A	A	A	A	UN	UN	UN
Shrub	1.0-3.0	A	A	A	A	A	A	A	UN	UN	UN
Shrub	>3.0	A	A	A	A	A	A	A	UN	UN	UN
Tree	0-5	B	B	B	B	B	C	C	C	UN	UN
Tree	5-10	B	B	B	B	B	C	C	C	UN	UN
Tree	10-25	B	B	B	B	B	C	C	C	UN	UN
Tree	25-50	C	C	C	C	C	C	C	C	UN	UN
Tree	>50	C	C	C	C	C	C	C	C	UN	UN

Succession class letters A-E are described in the Succession Class Description section. Some classes use a leafform distinction where a qualifier is added to the class letter: Brdl (broadleaf), Con (conifer), or Mix (mixed conifer and broadleaf). UN refers to uncharacteristic native or a combination of height and cover that would not be expected under the reference condition. NP refers to not possible or a combination of height and cover which is not physiologically possible for the species in the BpS.

Description

Class A 36 Early Development 1 - All Structures

Indicator Species

Symbol	Scientific Name	Common Name	Canopy Position
ARGL3	Arctostaphylos glandulosa	Eastwood's manzanita	Upper
CECO	Ceanothus cordulatus	Whitethorn ceanothus	Upper
CEIN3	Ceanothus integerrimus	Deerbrush	Upper

Description

Early succession, after large patches of stand replacement fire with grass, shrubs, and a few tree seedlings to saplings present. Arctostaphylos and ceanothus are common. Shrub cover can range up to 70% canopy closure.

Maximum Tree Size Class

Pole 5-9" DBH

Class B	37	Mid Development 1 - Open
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Indicator Species

Symbol	Scientific Name	Common Name	Canopy Position
CECO	<i>Ceanothus cordulatus</i>	Whitethorn ceanothus	Upper
ARGL3	<i>Arctostaphylos glandulosa</i>	Eastwood's manzanita	Upper
CEIN	<i>Ceanothus incanus</i>	Coast whitethorn	Mid-Upper

Description

Open or closed shrublands (10-100% cover possible) and scattered pole to medium-sized conifers may be present, depending on topography, fire frequency, and soil development. Characteristic shrubs include *Ceanothus cordulatus*, *Ceanothus integerrimus*, *Arctostaphylos glandulosa*, *Arctostaphylos glauca*, and *Arctostaphylos pringlei*. Scattered tree species could include *Pinus coulteri*, *Pinus ponderosa*, *Pinus jeffreyi*, *Abies concolor*, and *Quercus kelloggii*.

Maximum Tree Size Class

Medium 9-21"DBH

Class C	27	Late Development 1 - Open
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Indicator Species

Symbol	Scientific Name	Common Name	Canopy Position
PIJE	<i>Pinus jeffreyi</i>	Jeffrey pine	Upper
PIPO	<i>Pinus ponderosa</i>	Ponderosa pine	Upper
ABCO	<i>Abies concolor</i>	White fir	Upper
PICO3	<i>Pinus coulteri</i>	Coulter pine	Upper

Description

Open or closed shrublands with scattered large- and very large-sized conifers, and sometimes medium- and small-sized shade tolerant conifers. Trees >35% can occur in small to moderately sized patches on north aspects and lower slope positions. Trees include Jeffrey pine, ponderosa pine, Coulter pine, white fir, sugar pine, incense cedar, and black oak. Above listed shrubs still present.

Maximum Tree Size Class

Very Large >33"DBH

Model Parameters

Deterministic Transitions

From Class	Begins at (yr)	Succeeds to	After (years)
Early1:ALL	0	Mid1:OPN	24
Mid1:OPN	25	Mid1:OPN	999
Late1:OPN	80	Late1:OPN	999

Probabilistic Transitions

Disturbance Type	Disturbance occurs In	Moves vegetation to	Disturbance Probability	Return Interval (yrs)	Reset Age to New Class Start Age After Disturbance?	Years Since Last Disturbance
Replacement Fire	Early1:ALL	Early1:ALL	0.013	77	Yes	0
Alternative Succession	Mid1:OPN	Late1:OPN	1	1	Yes	55
Mixed Fire	Mid1:OPN	Mid1:OPN	0.013	77	No	0
Replacement Fire	Mid1:OPN	Early1:ALL	0.02	50	Yes	0
Mixed Fire	Late1:OPN	Late1:OPN	0.013	77	No	0
Replacement Fire	Late1:OPN	Early1:ALL	0.02	50	Yes	0

References

Conard, S.G. and S.R. Radosevich. 1982. Post-fire succession in white fir (*Abies concolor*) vegetation of the northern Sierra Nevada. *Madrono* 29: 42-56.

Esser, L.L. 1994. *Cupressus forbesii*. In Fire Effects Information Systems. [Online]. USDA Forest Service Rocky Mountain Research Station, Fire Sciences Laboratory (Producer). Available: <http://www.fs.fed.us/database/feis/>. June 28 2006.

Griffen, J.R. and W.B. Critchfield. 1972. The distribution of forest trees in California. Gen. Tech. Rep. PSW-82 (Reprinted w/ supplement 1976). Berkeley, CA: USDA Forest Service, Pacific Southwest Forest and Range Experiment Station.

NatureServe. 2007. International Ecological Classification Standard: Terrestrial Ecological Classifications. NatureServe Central Databases. Arlington, VA. Data current as of 10 February 2007.

Skinner, C.N. and C. Chang. 1996. Fire regimes past and present. In: Sierra Nevada Ecosystem project: Final report to Congress, vol. II, Assessments and scientific basis for management options. Davis, CA: University of California, Centers for Water and Wildland Resources. 1041-1070.

Vankat, J. L. and J. Major. 1978. Vegetation changes in Sequoia National Park. *J. Biogeog.* 5: 377-402.

van Wagtenonk, J.W. and J. Fites-Kaufmann. 2005. Fire in the Sierra Nevada Bioregion in: Sugihara, N. G., J. W. van Wagtenonk, J. Fites-Kaufman, K. E. Shaffer and A. E. Thode (eds.). *Fire in California ecosystems*. Berkeley, CA: University of California Press. In press.

Also of interest:

Wilken, G.C. 1967. History and fire record of a timberland brushfield in the Sierra Nevada of California. *Ecology* 48: 302-304.