

10990

California Xeric Serpentine Chaparral

BpS Model/Description Version: Aug. 2020

Update: 5/17/2018

Modelers		Reviewers	
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Vegetation Type

Shrubland

Map Zones

3

Geographic Range

This system occurs throughout Mediterranean California, excluding southern California, transverse and peninsular ranges.

Biophysical Site Description

This system occurs on thin rocky ultramafic (gabbro, peridotite, serpentinite) soils and in areas below winter snow accumulations that typically experience hot and dry summers.

Not all ultramafic outcrops support distinct vegetation. Only those with very low Ca:Mg ratio impact biotic composition. This system is highly variable and spotty in distribution.

Vegetation Description

This system is highly variable and spotty in distribution. Characteristic plant species include *Cupressus macnabiana*, *Quercus durata*, *Arctostaphylos viscida*, *A. pungens*, and *A. glauca*. Common associates include *Adenostoma fasciculatum*, *Ceanothus cuneatus*, *Fremontodendron californicum*, and California endemics, e.g., *Ceanothus jepsonii*. *Pinus sabiniana* can occur at varying cover from trace to more abundant. Lots of locally endemic and often rare forbs, such as *strepanthus* spp., *hesperolinon* spp., *eriogonum* spp., *madia* (= *harmonia*) spp., *Mimulus* spp., *allium* spp., *aesclepias solanoana*. This chaparral type tends to have fewer trees than the mesic chaparral.

BpS Dominant and Indicator Species

Symbol	Scientific Name	Common Name
CUMA	<i>Cupressus macnabiana</i>	Macnab's cypress
QUDU4	<i>Quercus durata</i>	Leather oak
ARVI4	<i>Arctostaphylos viscida</i>	Sticky whiteleaf manzanita
ARPU5	<i>Arctostaphylos pungens</i>	Pointleaf manzanita
ARGL4	<i>Arctostaphylos glauca</i>	Bigberry manzanita

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

Disturbance Description

Due to the poor soil nutrient levels, biomass accumulation tends to be significantly lower in these serpentine systems than in neighboring patches of sandstone chaparral. As a result, fire frequency and fire severity are reduced. A study at the McLaughlin Reserve (Safford and Harrison, 2000) found that time since last fire was nearly four times longer than on non-serpentine sites, and severity was also significantly reduced. The effects of fire on diversity in these systems are less pronounced than in non-serpentine systems, though they may be longer lasting (Safford and Harrison, 2004).

The model's fire regime parameters were informed from the R1CHAP model, but duration of Class A was lengthened and probability of fire was reduced to reflect the generally lower productivity of these sites. Fire severity is also reduced possibly due to lower biomass on the sites.

Fire Frequency

Severity	Avg FI	Percent of All Fires	Min FI	Max FI
Replacement	80	100	40	150
Moderate (Mixed)				
Low (Surface)				
All Fires	80	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

Wildfires typically burn 100s-1,000s of acres. A small percentage may burn more than 10,000 acres.

Adjacency or Identification Concerns

This chaparral type tends to have fewer trees than mesic chaparral. In Yolo, Napa, and Lake counties it occurs as patches among scattered serpentine and non-serpentine grasslands and non-serpentine chaparral.

Issues or Problems

Safford suggested that these two serpentine shrub systems (1099 and 1034) be combined since the dynamics are data-poor and hard to map separately.

The model is questionable in that if this is a xeric system, why would it be expected to see >60% cover for 85% of the BpS? (Creasy, personal communication).

Native Uncharacteristic Conditions

Comments

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	B	B	B	B
Shrub	0.5-1.0	A	A	A	A	A	A	B	B	B	B
Shrub	1.0-3.0	A	A	A	A	A	A	B	B	B	B
Shrub	>3.0	A	A	A	A	A	A	B	B	B	B
Tree	0-5	B	B	B	B	B	B	B	B	B	B
Tree	5-10	B	B	B	B	B	B	B	B	B	B
Tree	10-25	B	B	B	B	B	B	B	B	B	B
Tree	25-50	B	B	B	B	B	B	B	B	B	B
Tree	>50	B	B	B	B	B	B	B	B	B	B

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 18 Early Development 1 - All Structures

Indicator Species

Symbol	Scientific Name	Common Name	Canopy Position
CUMA	Cupressus macnabiana	Macnab's cypress	Lower
QU DU4	Quercus durata	Leather oak	Lower
ADFA	Adenostoma fasciculatum	Chamise	Lower

Description

Shrub seedlings, fire annuals and short lived perennials, geophytes. Many of the shrubs present before the fire are still present. The primary difference is the removal of thatch. This allows for a flush of forbs that thin out after a few years. Species richness is relatively stable through the early years of recovery after fire.

Maximum Tree Size Class

Pole 5-9" DBH

Class B 82 Late Development 1 - Closed

Indicator Species

Symbol	Scientific Name	Common Name	Canopy Position
ADFA	Adenostoma fasciculatum	Chamise	Middle
CUMA	Cupressus macnabiana	Macnab's cypress	Mid-Upper
QU DU4	Quercus durata	Leather oak	Mid-Upper

Description

Shrubs are well established, herbs mostly in openings. *Adenostoma* is present under and around the Oak. MacNab's cypress increases in more mesic locations (riparian areas or above about 1800ft). Some short statured shrubs (e.g. *Ceanothus jepsonii*) may have dropped out.

Upper layer can be the emerging trees through the canopy of shrubs. The dominant shrub canopy closure is 70-100%. The sporadic tree canopy can be 0-50% closure, height <10m. Classes A and B should be distinguished based on canopy closure of the shrub layer, rather than the tree layer.

Maximum Tree Size Class

Medium 9-21"DBH

Model Parameters

Deterministic Transitions

From Class	Begins at (yr)	Succeeds to	After (years)
Early1:ALL	0	Late1:CLS	15
Late1:CLS	16	Late1:CLS	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	0.0075	133	Yes	0
Replacement Fire	Late1:CLS	Early1:ALL	0.0135	74	Yes	0

References

Harrison, S., B.D. Inouye and H.D. Safford. 2003. Ecological heterogeneity in the effects of grazing and fire on grassland diversity. *Conservation Biology* 7(3) June 2003: 837-845.

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

Safford, H.D. and Susan Harrison. 2008. The effects of fire on serpentine vegetation and implications for management. Proceedings of the 2002 Fire Conference on Managing Fire and Fuels in the Remaining Wildlands and Open Spaces of the Southwestern United States. USDA Forest Service General Technical Report PSW-GTR 189: 321-28.

Safford, H.D. and Susan Harrison. 2004. Fire effects on plant diversity in serpentine vs. sandstone chaparral. *Ecology*, 85(2) 2004: 539-548.