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Southern California Dry-Mesic Chaparral

BpS Model/Description Version: Aug. 2020

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Vegetation Type

Shrubland

Map Zone

4

Geographic Range

This system occurs throughout Mediterranean California away from the coastal fog belt.

Biophysical Site Description

Commonly occurs on xeric, high-insolation, south-facing slopes up to ~183m (600ft). Average rainfall 14-25in.

Vegetation Description

Chaparral is composed of woody, sclerophyllous shrubs that generally vary from 1-4m in height. Shrub cover is usually dense and continuous, covering vast areas of land. The xeric, south-facing chaparral vegetation is primarily composed of shallow-rooted obligate seeders or facultative seeders that generate a persistent seedbank that is cued by fire to germinate. The facultative seeders, such as *Adenostoma fasciculatum*, are also able to resprout following fire. Obligate seeders generally do not recruit in the absence of fire, and they require 10-25yrs to replenish their seedbank (sufficient enough to produce seedlings following fire).

BpS Dominant and Indicator Species

Symbol	Scientific Name	Common Name
ADFA	<i>Adenostoma fasciculatum</i>	Chamise
CEME	<i>Ceanothus megacarpus</i>	Bigpod ceanothus
CEGR	<i>Ceanothus greggii</i>	Desert ceanothus
CELE	<i>Ceanothus lemmonii</i>	Lemmon's ceanothus
ARGL4	<i>Arctostaphylos glauca</i>	Bigberry manzanita
ADSP	<i>Adenostoma sparsifolium</i>	Redshank
YUWH	<i>Yucca whipplei</i>	Chaparral yucca

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

Disturbance Description

Chaparral burns in high-intensity, stand-replacing crown fires, resulting in even-aged stands in which the post-fire composition (after 5-10yrs) is largely the same as the pre-fire composition (referred to as autosuccession by Hanes 1971). The fuel is drier and more flammable than mesic

chaparral. *Adenostoma fasciculatum* is particularly flammable with a large surface-area-to-volume ratio. Season of burning may play a role in species composition. In the last century, the high frequency of human ignitions has reduced the mean fire return interval (MFRI) to 30-35yrs in southern California, and some areas have burned repeatedly, resulting in local extirpation and conversion to other vegetation types. The largest fires are typically the product of strong off-shore winds (such as the Santa Anas in southern California).

MFRI varies according to species composition and environmental conditions. Sediment cores taken from the Santa Barbara Channel in central California dating from the 16th and 17th centuries showed two major peaks in charcoal deposition about a century apart, suggesting historic presence of very large fires (Mensing 1998; Mensing et al. 1999). Mensing (1998) and Mensing et al. (1999) found that the frequency of large charcoal peaks appeared fairly constant over the ~560yr period documented in the cores. Their foremost conclusion was that their sediment stratigraphy did not document any strong change in frequency of charcoal peaks over the entire period or during any of the major land use periods (Native American, Spanish and early American, or modern American). They concluded that the frequency of really large fires (at least in southern Santa Barbara County) is controlled by decadal (and longer) drought cycles and by the annual fall occurrences of extreme fire weather, then as now.

Fire Frequency

Severity	Avg FI	Percent of All Fires	Min FI	Max FI
Replacement	51	100	30	125
Moderate (Mixed)				
Low (Surface)				
All Fires	51	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

Fire ecologists disagree about the size distribution of fires prior to European settlement in California. A reviewer pointed to studies of fire distribution in Baja California, Mexico, which show small patch sizes (100s of ha); summer ignitions there result in fires that burn until they reach younger, less flammable vegetation and then go out. Fire suppression is generally not practiced, and these studies maintain that this pattern existed in southern California before, and even for a while after, European settlement (see Minnich 1983; Minnich and Chou 1997; Minnich et al. 2000; Minnich 2001, 2006). Other studies conducted in California have shown that large fires (1,000s of ha) driven by Santa Ana or “sundowner” winds occurred throughout the 20th century, even before the era of effective fire suppression. These authors suggest that very large fall fires have always been characteristic of southern California chaparral. Both contingents base their analysis on relatively recent records -- since the 1920s in general, a time when most fire starts were probably anthropogenic in both areas. They disagree on the extent to which large wind events occur in Baja California compared to Alta California. We can probably never resolve this debate.

Current fire size is strongly skewed, with small fires (10-100ha) more likely to occur than large fires (up to 100,000ha) due to the large number of human-caused ignitions coupled with effective initial attack fire suppression in southern California. A small percentage of the fires accounts for the bulk of area burned (~10% of the fires result in 75% of the area burned).

Adjacency or Identification Concerns

This chaparral type may be adjacent to or mix with coastal sage scrub on coastal slopes, where the chaparral would be located farther away from the coast at higher locations. It may also be adjacent to interior coastal sage scrub or to mesic chaparral at ridge tops.

Issues or Problems

Due to the length of time required to replenish seedbanks, these chaparral species are sensitive to repeat fires (at fire return intervals from 5-15yrs). With increasing fire frequency from human ignitions and the presence of exotic annual grasses, there is a potential for widespread type conversion of shrublands to other vegetation types, including exotic grasslands. The exotic grasses (such as *Avena* spp. and *Bromus* spp.) can sustain very high fire frequency and promote fire, thereby causing a positive feedback cycle of increasing fire frequency in an environment with abundant anthropogenic ignitions.

Native Uncharacteristic Conditions

See issues/problems. Biggest issue is exotic annual grasses and type conversion of shrublands under repeated fires.

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	B	B	B	B	B
Shrub	0.5-1.0	A	A	A	A	A	B	B	B	B	B
Shrub	1.0-3.0	A	A	A	A	A	B	B	B	B	B
Shrub	>3.0	A	A	A	A	A	B	B	B	B	B
Tree	0-5	B	B	B	B	B	UN	UN	UN	UN	UN
Tree	5-10	B	B	B	B	B	UN	UN	UN	UN	UN
Tree	10-25	B	B	B	B	B	UN	UN	UN	UN	UN
Tree	25-50	B	B	B	B	B	UN	UN	UN	UN	UN
Tree	>50	B	B	B	B	B	UN	UN	UN	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	19	Early Development 1 - Open
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Indicator Species

Symbol	Scientific Name	Common Name	Canopy Position
LOSC2	<i>Lotus scoparius</i>	Common deerweed	Lower
PHACE	<i>Phacelia</i>	Phacelia	Lower
CRYPT	<i>Cryptantha</i>	<i>Cryptantha</i>	Lower
EMMEN	<i>Emmenanthe</i>	Whisperingbells	Lower

Description

The shrub species listed above will be present as seedlings from a fire-cued seedbank, resprouts from facultative seeders, in addition to fire annuals, perennial geophytes, and short-lived perennials, including *Lotus scoparius*, *Papaver californicum*, *Phacelia* spp., *cryptantha* spp., and *Emmenanthe* spp.

Maximum Tree Size Class

None

Class B	81	Late Development 1 - Closed
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Indicator Species

Symbol	Scientific Name	Common Name	Canopy Position
ADFA	<i>Adenostoma fasciculatum</i>	Chamise	Upper
CEME	<i>Ceanothus megacarpus</i>	Bigpod ceanothus	Upper
CELE	<i>Ceanothus lemmonii</i>	Lemmon's ceanothus	Upper
ARGL4	<i>Arctostaphylos glauca</i>	Bigberry manzanita	Upper

Description

Shrubs growing from seedlings or resprouts from Class A. Herbs only in openings. Representative species include *Adenostoma fasciculatum*, *Adenostoma sparsifolium*, *Adolphia californica*, *Ceanothus megacarpus*, *Ceanothus crassifolius*, *Ceanothus foliosus*, *Ceanothus greggii*, *Arctostaphylos pungens*, *Arctostaphylos glauca*, and *Arctostaphylos parryana*. The obligate seeders require fire to persist on the landscape but can generally live from 75-150yrs.

Maximum Tree Size Class

None

Model Parameters

Deterministic Transitions

From Class	Begins at (yr)	Succeeds to	After (years)
Early1:OPN	0	Late1:CLS	10
Late1:CLS	11	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
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Replacement Fire	Early1:OPN	Early1:OPN	0.01	100	Yes	0
Replacement Fire	Late1:CLS	Early1:OPN	0.0222	45	Yes	0

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