11050
Northern and Central California Dry-Mesic Chaparral

BpS Model/Description Version: Aug. 2020

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Vegetation Type
Shrubland

Map Zones
3, 6, 7

Geographic Range
This system occurs throughout California, away from the coastal fog belt, and through the northern end of the central valley and into southern Oregon.

Biophysical Site Description
In the north coastal region, chaparral is diminished in extent compared to the southern part of the state. In the Sierra Nevada, chaparral occurs in the foothills on the western slopes. In the coast ranges, chaparral is found largely on interior slopes and in large patches in the Siskiyou, Cascade, and Klamath mountains. The northern limits are the dry parts of the Rogue River watershed in Oregon. Annual precipitation should be greater than in the southern part of California: up to 100cm. Dry-mesic chaparral is located in the interior valleys and on xeric, south-facing slopes in the coastal ranges.

Vegetation Description
This vegetation type is composed primarily of shallow-root obligate seeders or facultative seeders that generate a persistent seed bank cued by fire to germinate. The facultative seeders are also able to resprout after fire (facultative seeders comprise a minor part of this community in the Klamath Mountains). Where canopy cover is high, these species generally do not recruit in the absence of fire. However, a low but sustained level of recruitment in canopy gaps, such as in stands that are very old or disturbed, may be sufficient to ensure persistence of this community type in long-unburned stands (Duren and Muir 2010). Dry-mesic chaparral requires at least 5-25yrs to replenish its seed bank (sufficient enough to produce seedlings after fire).

This system is made up of a mixture of mostly obligate seeders. Characteristic species include *Adenostoma fasciculatum*, *Ceanothus cuneatus*, *Arctostaphylos viscida*, *A. manzanita*, *A. glauca*, *A. glandulosa*, *A. stanfordiana*, *Fremontodendron californicum*, *Malacothamnus fasciculatus*, *Dendromecon rigida*, and *Pickeringia montana*. In Oregon's Jackson and Josephine counties, additional species are *Cercocarpus betuloides*, *Garrya fremontii*, *Prunus subcordata*, and *Toxicodendron diversilobum*.

BpS Dominant and Indicator Species

Symbol	Scientific Name	Common Name
ADFA	*Adenostoma fasciculatum*	Chamise
CECU	*Ceanothus cuneatus*	Buckbrush
ARCTO3	*Arctostaphylos*	Manzanita
FRCA6	*Fremontodendron californicum*	California flannelbush
MAFA	*Malacothamnus fasciculatus*	Mendocino bushmallow
DERI	*Dendromecon rigida*	Tree poppy
PIMO5	*Pickeringia montana*	Montana chaparral pea

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-age 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. Mean fire return intervals (FRIs) vary 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 indicate that large fires burned the Santa Ynez and Santa Lucia mountains every 40-60yrs. Season of burning may play a role in species composition. The largest fires are often the product of strong offshore winds (such as the Santa Anas in southern California).

Fire Frequency

Severity	Avg FI	Percent of All Fires	Min FI	Max FI
Replacement	74	100	30	125
Moderate (Mixed)				
Low (Surface)				
All Fires	74	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 can burn thousands and tens of thousands of acres, especially when driven by Santa Ana winds; a small percentage burns >100,000ac. In some areas, typical fire size may be much smaller. For example, in Jackson and Josephine county chaparral stands, mean area burned was 111ac prior to 1940 (taken as the year of effective fire suppression) and 57ac thereafter (based on fire record maintained by BLM, 1910-2007; see Appendix D in Duren [2009]).

Adjacency or Identification Concerns

In northern California, chaparral can merge with annual grass and blue oak-gray pine (Pinus Sabiniana) at lower elevations, and with coastal oak, ponderosa pine, or mixed-conifer forest types at higher elevations. In the central coastal regions of California, chaparral forms a patchwork with grassland, coastal sage scrub, and broadleaf and coniferous forests.

Issues or Problems

Due to the length of time required to replenish seed banks, obligate seeders are sensitive to repeat fires (FRI of 5-12yrs). 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 grasslands. According to Halsey (pers. comm.), there has already been much type conversion of this biophysical setting (BpS). In southern California, exotic grasses (*Avena* spp. and *Bromus* spp.) can sustain very high fire frequency and can promote fire, thereby causing a positive feedback cycle of increasing fire frequency. However, in the Klamath Mountains, fire frequency in chaparral (as well as in landscape as a whole) appears to have been reduced since 1940 (based on fire records maintained by BLM, 1910-2007; see Appendix D in Duren [2009]).

In some areas, a more pressing issue may be fuels management. Prescriptions that greatly reduce chaparral canopy cover degrade stands ecologically. Obligate-seeding species recruitment after treatment is 10-100+ times lower than after fire, and non-native annuals invade (Duren and Muir 2010).

Native Uncharacteristic Conditions
The biggest issues in this BpS are exotic annual grasses and type conversion of shrublands under repeated fires and fuel treatments.

Comments

During the 2016 model review period, this model was reviewed and descriptive changes made by Olivia Duren (olivia@thefreshwatertrust.org). Keith Perchemlides (The Nature Conservancy) provided information used to define succession class mapping rules. During the review, there was discussion about the applicability of this model further south in CA especially to the southern extent of the Sierra Nevada (map zone 6). Future review should consider this issue.

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 10 **Early Development 1 - All**

Indicator Species

Symbol	Scientific Name	Common Name	Canopy Position
ADFA	Adenostoma fasciculatum	Chamise	Upper
LOSC2	Lotus scoparius	Common deerweed	Upper
CEANO	Ceanothus	Ceanothus	Upper
ARCTO3	Arctostaphylos	Manzanita	Upper

Description

The shrub species listed in the previous table will be present as seedlings from a fire-cued seed bank, resprouts from facultative seeders, in addition to fire annuals, perennial geophytes, and short-lived perennials. Herb species may include common deerweed (*Lotus scoparius*), *Phacelia* spp., *Cryptantha* spp., and *Emmenanthe* spp. The temporary post-fire vegetation starts to drop out within approximately 5yrs, after which the seedlings begin to predominate in similar composition as pre-fire conditions.

The relationship of age to height or cover of chaparral varies greatly with species and setting. Estimates of cover and height provided here are intended for use in mapping, not field identification of s-classes.

Maximum Tree Size Class

None

Class B 87 **Late Development 1 - Closed**

Indicator Species

Symbol	Scientific Name	Common Name	Canopy Position
ADFA	Adenostoma fasciculatum	Chamise	Upper
CEANO	Ceanothus	Ceanothus	Upper
ARCTO3	Arctostaphylos	Manzanita	Upper

Description

Shrubs growing from seedlings from Class A; herbs, only in openings. Species may include chamise (*Adenostoma fasciculatum*), *Ceanothus megacarpus*, *C. leucodermis*, *C. cuneatus*, *Arctostaphylos glauca*, and *A. viscida*. Trees may be present at low cover levels and may have a shrubby growth form.

Moderate-frequency fire is likely to best sustain robust canopy cover of dry-mesic chaparral. However, a low but sustained level of recruitment in canopy gaps, such as in stands that are very old or are disturbed, may be sufficient to ensure persistence of this community type in long-unburned stands (Duren and Muir 2010; Keeley et al. 2005; Nagel and Taylor 2005). Dominant species can generally live from 75-150yrs.

The relationship of age to height or cover of chaparral varies greatly with species and setting. Estimates of cover and height provided here are intended for use in mapping, not field identification of s-classes.

Maximum Tree Size Class
None

Model Parameters

Deterministic Transitions

From Class	Begins at (yr)	Succeeds to	After (years)
Early1:ALL	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
Replacement Fire	Early1:ALL	Early1:ALL	0.01	100	Yes	0
Replacement Fire	Late1:CLS	Early1:ALL	0.014	71	Yes	0

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