

11050

Northern and Central California Dry-Mesic Chaparral

BpS Model/Description Version: Aug. 2020

Modelers		Reviewers	
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Vegetation Type

Shrubland

Map Zones

4, 5

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 the state, up to 100cm. Dry-mesic chaparral is located in the interior valleys and on xeric, south-facing slopes in the coastal ranges.

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 seed bank 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 seed bank (sufficient enough to produce seedlings following fire). This biophysical setting (BpS) includes mostly obligate seeders.

BpS Dominant and Indicator Species

Symbol	Scientific Name	Common Name
ADFA	<i>Adenostoma fasciculatum</i>	Chamise
CECU	<i>Ceanothus cuneatus</i>	Buckbrush
ARCTO3	<i>Arctostaphylos</i>	Manzanita
FRCA6	<i>Fremontodendron californicum</i>	California flannelbush
MAFA	<i>Malacothamnus fasciculatus</i>	Mendocino bushmallow

DERI	<i>Dendromecon rigida</i>	Tree poppy
PIMO5	<i>Pickeringia montana</i>	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. 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).

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 showed two major peaks in charcoal deposition about a century apart, suggesting a historical presence of 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 approximately 560-yr 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 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.

One LANDFIRE National reviewer suggested the FRI should be about 40yrs. Modeler felt that the original estimated FRI (70yrs) may be too high, but that 40yrs was too low because an FRI that short was likely influenced by modern anthropogenic burning. The model was revised to achieve a compromise between these two view points and now has a 50-yr FRI.

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 size is strongly skewed, with small fires (10-100ha) more likely to occur than large fires (up to 100,000ha). A small percentage of the fires accounts for the bulk of area burned (approximately 10% of the fires result in 75% of the area burned).

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 forest.

Issues or Problems

Due to the length of time required to replenish seed banks, obligate seeders are sensitive to repeat fires (at FRIs from 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. The exotic grasses (*Avena* spp. and *Bromus* spp.) can sustain very high fire frequency and promote fire, thereby causing a positive feedback cycle of increasing fire frequency.

Native Uncharacteristic Conditions

Biggest issue is exotic annual grasses and type conversion of shrublands from repeated fires.

Comments

Map zone (MZ) 4 and MZ05 were combined during the 2015 BpS review.

Experts suggest this type would be more aptly named Northern and Central California Xeric Chaparral.

A reviewer for MZ04 and MZ05 indicated that 1110 and 1105 could be lumped together because the VDDT models are not quantitatively different. This suggestion was not implemented because of the species and descriptive differences between the two systems.

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
ADFA	Adenostoma fasciculatum	Chamise	Lower
LOSC2	Lotus scoparius	Common deerweed	Lower
PHACE	Phacelia	Phacelia	Lower
CRYPT	Cryptantha	Cryptantha	Lower

Description

The shrub species listed in the table are present as seedlings from a fire-cued seed bank, resprouts from facultative seeders, and fire annuals, perennial geophytes, and short-lived perennials. Herb species 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 and resprouts begin to predominate in similar composition as pre-fire conditions.

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	Adenostoma fasciculatum	Chamise	Upper
CEME	Ceanothus megacarpus	Bigpod ceanothus	Upper
CELE2	Ceanothus leucodermis	Chaparral whitethorn	Upper
ARGL4	Arctostaphylos glauca	Bigberry manzanita	None

Description

Shrubs growing from seedlings or resprouts from Class A. Herbs only in openings. Characteristic species include *Adenostoma fasciculatum*, *Ceanothus cuneatus*, *Arctostaphylos viscida*, *Arctostaphylos manzanita*, *Arctostaphylos glauca*, *Arctostaphylos glandulosa*, *Arctostaphylos stanfordiana*, *Fremontodendron californicum*, *Malacothamnus fasciculatus*, *Dendromecon rigida*, and *Pickeringia montana*. 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
Replacement Fire	Early1:OPN	Early1:OPN	0.01	100	Yes	0
Replacement Fire	Late1:CLS	Early1:OPN	0.0222	45	Yes	0

References

Byrne, R.I., J. Michaelsen and A. Soutar. 1977. Fossil charcoal as a measure of wildfire frequency in southern California: a preliminary analysis. In H.A. Mooney and C.E. Conrad, eds. Proceedings of the symposium on environmental consequences of fire and fuel management in Mediterranean ecosystems. Gen. Tech. Rep. WO-3. USDA Forest Service: 361-361.

Conard, C.E. 1987. Common shrubs of chaparral and associated ecosystems of southern California. Gen. Tech. Rep. PSW-99. Berkeley, CA: Pacific Southwest Forest and Range Experiment Station.

Hanes, T.L. 1971. Succession after fire in the chaparral of southern California. Ecological Monographs 41: 27-52.

Keeley, J.E. 2000. Chaparral. In: Barbour, M.G. and W.D. Billings, eds. North American Terrestrial Vegetation. 2nd Edition. NY: Cambridge University Press. 203-253.

Keeley J.E. 2002. Native American impacts on fire regimes of the California coastal ranges. Journal of Biogeography 29: 303-320.

Keeley, J.E. Fire in the South Coast region. 2005. In J. Fites-Kaufman, N. Sugihara and J. van Wangtendonk, eds. Fire Ecology of California Ecosystems. University of California Press. In press.

Keeley, J.E., C.J. Fotheringham and M. Morais. 1999. Reexamining fire suppression impacts on brushland fire regimes. Science 284: 1829-1832.

Keeley, J.E. and C.J. Fotheringham. 2001. The historical role of fire in California shrublands. Conservation Biology 15: 1536-1548.

Keeley, J.E. and C.J. Fotheringham. 2001. History and management of crown-fire ecosystems: A summary and response. Conservation Biology 15: 1561-1567.

Keeley, J.E. and C.J. Fotheringham. 2003. Impact of past, present, and future fire regimes on North American Mediterranean shrublands. In: Veblen, T.T., W.L. Baker, G. Montenegro and

T.W. Swetnam, eds. Fire and Climatic Change in Temperate Ecosystems of the Western Americas. NY: Springer. 218-262

Mensing, S.A. 1998. 560 years of vegetation change in the region of Santa Barbara, California. *Madroño* 45(1): 1-11.

Mensing, S.A., J. Michaelsen et al. 1999. A 560-Year Record of Santa Ana Fires Reconstructed from Charcoal Deposited in the Santa Barbara Basin, California. *Quaternary Research* 51: 295-305.

Moritz, M.A., J.E. Keeley, E.A. Johnson and A.A. Schaffner. 2004. Testing a basic assumption of shrubland fire management: Does the hazard of burning increase with the age of fuels? *Frontiers in Ecology and the Environment* 2: 67-72.

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

Wells P.V. 1962. Vegetation in relation to geological substratum and fire in the San Luis Obispo quadrangle, California. *Ecological Monographs* 32: 79-103.

Zedler, P.H. 1995. Plant life history and dynamic specialization in the chaparral/coastal sage scrub flora in southern California. In: Arroyo, M.T.K., P.A. Zedler and M.D. Fox, eds. *Ecology and Biogeography of Mediterranean Ecosystems in Chile, California, and Australia*. NY: Springer-Verlag. 89-115.

Zedler, P.H., C.R. Gautier, C.R. and G.S. McMaster. 1983. Vegetation change in response to extreme events: the effect of a short interval between fires in California chaparral and coastal sage scrub. *Ecology* 64: 809-818.