

10581

Sierra Nevada Subalpine Lodgepole Pine Forest and Woodland -- Wet

BpS Model/Description Version: Aug. 2020

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Vegetation Type

Forest and Woodland

Map Zone

6

Model Splits or Lumps

This Biophysical Setting (BpS) is split into multiple models: this cold, wet type (10581) and a dry type (10582). BpS 10581 is found predominantly on gently rolling lower slopes and drainage bottoms whereas 10582 is predominantly found on benches and moderate slopes.

Geographic Range

Cold, wet lodgepole pine is distributed in the upper montane of the central and southern portions of the Sierra Nevada. Stands are typically located at elevations ranging from ~2,000-3,200m (Potter 1994).

Biophysical Site Description

Cold, wet lodgepole pine occurs on upper montane sites, usually on gently rolling lower slopes and drainage bottoms (Potter 1994, 1998). Stands are typically in broken terrain and, thus, few large contiguous areas of this type exist. The climate is Mediterranean with wet winters (Nov-Apr) and dry summers, although summer thunderstorms occur sporadically. Sites are moist and more productive than dry, cool subalpine lodgepole. Fuels are composed of a matrix of herbaceous vegetation and pine debris.

Vegetation Description

The understory is diverse with graminoids and forbs (cover >50%). Tree cover is generally moderate to dense. There is an increasing dominance of red fir and western white pine at lower elevations. Lodgepole can be seral to these species and, at higher elevations, mountain hemlock is present. Associated plant species include *Arctostaphylos nevadensis*, *Ceanothus cordulatus*, *Chrysolepis sempervirens*, *Phyllodoce breweri*, and *Ribes montigenum*. Common graminoids include *Poa wheeleri*, *Carex filifolia*, *Carex rossii*, and *Carex exserta*.

BpS Dominant and Indicator Species

Symbol	Scientific Name	Common Name
PICO	<i>Pinus contorta</i>	Lodgepole pine

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

Disturbance Description

Disturbance patterns have been poorly studied in Sierra lodgepole pine. Sierra lodgepole has been described as not being a fire type (Barbour and Minnich 2000) or as having long intervals between fires (Parker 1986; Keeley 1980; Potter 1998). Somewhat similar wet lodgepole types in the Klamath Mountains and Oregon had a fire return interval (FRI) range of 70-100yrs. Fire season is generally late summer to early fall. Stand-replacement fire occurs at long intervals, resulting in low stand complexity. Mixed-severity fire occurs when fuel conditions remain moist and result in mixed-age stands. Very infrequently, surface fires can occur.

Fire Frequency

Severity	Avg FI	Percent of All Fires	Min FI	Max FI
Replacement	158	23	37	764
Moderate (Mixed)	51	69		
Low (Surface)	460	8		
All Fires	36	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 ranges from small (a few hectares) to hundreds of hectares. The disturbance scale in areas with long-to-short FRIs is variable. Most fires are small (<1 ha), but the less common large fires affect large areas (10s-100s ha).

Adjacency or Identification Concerns

This type can be distinguished from 10582 because it is heavily dominated by lodgepole pine, with other conifers possibly present but not co-dominant. It occurs more along canyon bottoms, meadow fringes, and on toe-slope positions where there is more soil moisture.

Issues or Problems

Limited information about disturbance is available, and that information is from a limited geographic range of sites. Divergent fire occurrence patterns, ranging from moderate frequency to very long FRIs in this vegetation type, result in imprecise measures. Differences may be related to ignition and fire spread probabilities or to lack of data. Information applied to this type in most reviews was derived from studies in the Klamath Mountains rather than the Sierra Nevada.

Native Uncharacteristic Conditions

Comments

A reviewer proposed an alternative model with a time-since-fire transition from Class D to Class E, and less mixed fire in Class A. This alternative model resulted in 5%, 20%, 10%, 30%, and 35% in Classes A-E, respectively, with about the same amount of fire (mean FRI, 27yrs). Another reviewer felt that the fire interval range (70-100yrs) cited for the Klamaths and Oregon likely pertains in the Sierra, too.

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

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	6	Early Development 1 - All Structures
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Indicator Species

Symbol	Scientific Name	Common Name	Canopy Position
PICO	Pinus contorta	Lodgepole pine	Upper
CAREX	Carex	Sedge	Lower
POA	Poa	Bluegrass	Lower

Description

Lodgepole pine regeneration follows stand-replacing fire (severe understory fire or canopy fire). Moderate density to dog-hair thickets. Mixed or severe fires can occur.

Maximum Tree Size Class

None

Class B	28	Mid Development 1 - Closed
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Indicator Species

Symbol	Scientific Name	Common Name	Canopy Position
PICO	<i>Pinus contorta</i>	Lodgepole pine	Upper

Description

Symbol	Scientific Name	Common Name	Canopy Position
PICO	<i>Pinus contorta</i>	Lodgepole pine	Upper

Description

Old stands where fire has had minimal influence. Replacement fire or insects/disease reset. Mixed fire maintains. Insects/disease or wind/weather events can open the stand. Other insect/disease events can either reset or maintain.

Maximum Tree Size Class

None

Model Parameters

Deterministic Transitions

From Class	Begins at (yr)	Succeeds to	After (years)
Early1:ALL	0	Mid1:CLS	9
Mid1:CLS	10	Late1:CLS	49
Mid1:OPN	15	Late1:OPN	69
Late1:CLS	50	Late1:CLS	480
Late1:OPN	70	Late1:CLS	119

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	0.001	1000	Yes	0
Mixed Fire	Early1:ALL	Early1:ALL	0.033	30	No	0
Alternative Succession	Mid1:OPN	Mid1:CLS	1	1	Yes	15
Wind or Weather or Stress	Mid1:OPN	Early1:ALL	0.001	1000	Yes	0
Insects or Disease	Mid1:OPN	Early1:ALL	0.001	1000	Yes	0
Replacement Fire	Mid1:OPN	Early1:ALL	0.004	250	Yes	0
Surface Fire	Mid1:OPN	Mid1:OPN	0.02	50	No	0
Mixed Fire	Mid1:OPN	Mid1:OPN	0.033	30	No	0
Insects or Disease	Mid1:CLS	Mid1:CLS	0.0005	2000	No	0
Insects or Disease	Mid1:CLS	Early1:ALL	0.0005	2000	Yes	0
Insects or Disease	Mid1:CLS	Mid1:OPN	0.001	1000	Yes	0
Replacement Fire	Mid1:CLS	Early1:ALL	0.007	143	Yes	0
Mixed Fire	Mid1:CLS	Mid1:OPN	0.01	100	Yes	0
Wind or Weather or Stress	Late1:OPN	Late1:OPN	0.001	1000	No	0
Insects or Disease	Late1:OPN	Early1:ALL	0.001	1000	Yes	0
Replacement Fire	Late1:OPN	Early1:ALL	0.004	250	Yes	0
Surface Fire	Late1:OPN	Late1:OPN	0.02	50	No	0

Mixed Fire	Late1:OPN	Late1:OPN	0.033	30	No	0
Wind or Weather or Stress	Late1:CLS	Late1:OPN	0.001	1000	Yes	0
Insects or Disease	Late1:CLS	Late1:OPN	0.001	1000	Yes	0
Insects or Disease	Late1:CLS	Early1:ALL	0.001	1000	Yes	0
Replacement Fire	Late1:CLS	Early1:ALL	0.007	143	Yes	0
Mixed Fire	Late1:CLS	Late1:CLS	0.02	50	No	0

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