

10582

Sierra Nevada Subalpine Lodgepole Pine Forest and Woodland -- Dry

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

Geographic Range

Dry subalpine 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 ~2,400-3,200m.

Biophysical Site Description

Lodgepole dominates on upper montane dry sites, often located on benches but also occurring on moderate slopes. Stands are typically in broken terrain and, thus, few large contiguous areas of this type exist. Stands persist on nutrient-poor granitic or pumice soils (Sheppard and Lassoie 1988; Agee 1993; Keifer 1991). Climate is Mediterranean with wet winters (Nov-Apr) and dry summers, although summer thunderstorms occur sporadically. Forest understory is typically sparse with few shrubs and low-to-moderate herbaceous cover. Fuel is considered sparse (Parker 1986; van Wagtendonk 1991).

Vegetation Description

Stands can exist in a range of densities -- from open woodland to closed canopy (Potter 1994, 1998). In the south central Sierra Nevada, stands grade into foxtail pine at dry upper elevations (Rourke 1988; Keifer 1991). Western hemlock dominance increases at wetter sites in the central Sierra Nevada. At lower elevations and as available moisture increases, there is an increasing dominance of red fir and western white pine. On warmer, dry, lower elevation sites, lodgepole is associated with Jeffrey pine and western juniper. Understory species include *Antennaria* spp., *Arabis* spp., *Eriogonum* spp., and *Gayophytum* spp. (Potter 1994).

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. Stands in the southern Sierra Nevada have been described as self-perpetuating (regeneration from treefall gaps), with long intervals between fires (Parker 1986; Keeley 1980; Potter 1998). Sparse fuels are believed to limit ignition and fire spread (Parker 1986). In contrast, fire history studies from dry subalpine lodgepole pine forest in the southern Sierra have found moderate fire return intervals (FRIs) in some stands (Keifer 1991; Caprio in review, unpubl. data). Intervals ranged from 31-74yrs (Chagoopa Plateau, Sequoia National Park, and Palisades Canyon, Kings Canyon National Park). Fire severity was mixed and ranged from understory burns on areas up to hundreds of hectares to high-severity crown fire in patches up to tens of hectares. Fire region group is III. Fire season was late summer or early fall. Seasonal fire scar positions on Chagoopa and Palisades (SEKI) was 40.7% and 15% late wood and 59.3% and 80%, dormant respectively (Caprio unpubl. data). Other important disturbance agents in this system include the lodgepole needle miner and windthrow, and stress from extreme climatic events.

Fire Frequency

Severity	Avg FI	Percent of All Fires	Min FI	Max FI
Replacement	247	11	31	500
Moderate (Mixed)	57	46	31	350
Low (Surface)	60	43	9	350
All Fires	26	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

Disturbance scale in persistent stands is small (0.1ha, treefall [Parker 1986]). Disturbance scale in areas with long to short FRIs is variable. Most fires are small (<1 ha), but less common large fires affect large areas (tens to hundreds of hectares) and may have the greatest influence on forest dynamics. Severity is generally low (understory burns with individual to scattered groups of trees impacted) to less common stand-replacing fire -- either high-severity understory fire or canopy fire (patches up to tens of hectares on 5-20% of burned area) that occurs with more extreme weather (wind; observations by Sequoia-Kings Canyon National Park fire monitors during 1996 Chagoopa and 2003 Williams Fires burning in PICO).

Adjacency or Identification Concerns

Issues or Problems

Limited information about disturbance is available, and what information is available is from limited geographic sites. Fire occurrence patterns are highly variable, ranging from moderate frequency to very long FRIs. Differences may be related to ignition and fire spread probabilities.

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	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	8	Early Development 1 - All Structures
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Indicator Species

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

Description

Description: Lodgepole pine regeneration follows stand-replacing fire (severe understory fire or canopy fire). Moderate density to dog-hair thickets, plus resprouting grasses and forbs. Mineral soil cover is high in this system due to low soil moisture and poor soil development. Surface fire and replacement fire may occur.

Maximum Tree Size Class

Seedling <4.5ft

Class B	12	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

Mid-maturity lodgepole pine undergoes intrinsic stand thinning. Considerable surface fuel from tree mortality caused by previous fire. Replacement fire and insect/disease may reset. Surface fire, mixed-severity fire, insects, and disease occur.

Maximum Tree Size Class

Medium 9-21" DBH

Class C	16	Mid Development 1 - Open
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Indicator Species

Symbol	Scientific Name	Common Name	Canopy Position
PICO	Pinus contorta	Lodgepole pine	Upper

Description

Mid-maturity lodgepole pine where surface fire or other disturbance has opened the stand. Replacement fire and insects/disease or wind/weather may reset. Surface and mixed-severity fire occur.

Maximum Tree Size Class

Medium 9-21" DBH

Class D	57	Late Development 1 - Open
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Indicator Species

Symbol	Scientific Name	Common Name	Canopy Position
PICO	Pinus contorta	Lodgepole pine	Upper

Description

Areas that have experienced one or more low-severity understory fires that reduced stand density or old stands that have not experienced fire but have been thinned by other processes (treefalls, etc.). Stands are uneven age. Replacement fire and insects/disease may reset. Surface fire, mixed-severity fire, and wind/weather events occur.

Maximum Tree Size Class

Large 21-33" DBH

Class E	7	Late Development 1 - Closed
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Indicator Species

Symbol	Scientific Name	Common Name	Canopy Position
PICO	Pinus contorta	Lodgepole pine	Upper

Description

Old stands where fire has had minimal influence. Replacement fire and insects/disease may reset. Surface fire, mixed-severity fire, insects/disease, and wind/weather events occur.

Maximum Tree Size Class

Large 21-33" DBH

Model Parameters

Deterministic Transitions

From Class	Begins at (yr)	Succeeds to	After (years)
Early1:ALL	0	Mid1:CLS	14
Mid1:OPN	15	Late1:OPN	69
Mid1:CLS	15	Late1:CLS	69
Late1:OPN	70	Late1:OPN	999
Late1:CLS	70	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	0.005	200	Yes	0
Surface Fire	Early1:ALL	Early1:ALL	0.02	50	No	0
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	0.005	200	Yes	0
Surface Fire	Mid1:OPN	Mid1:OPN	0.02	50	No	0
Mixed Fire	Mid1:OPN	Mid1:OPN	0.02	50	No	0
Insects or Disease	Mid1:CLS	Mid1:OPN	0.0005	2000	Yes	0
Insects or Disease	Mid1:CLS	Early1:ALL	0.001	1000	Yes	0
Surface Fire	Mid1:CLS	Mid1:OPN	0.005	200	Yes	0
Replacement Fire	Mid1:CLS	Early1:ALL	0.005	200	Yes	0
Mixed Fire	Mid1:CLS	Mid1:OPN	0.025	40	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	0.02	50	No	0
Wind or Weather or Stress	Late1:CLS	Late1:OPN	0.0005	2000	Yes	0

Surface Fire	Late1:CLS	Late1:OPN	0.001	1000	Yes	0
Insects or Disease	Late1:CLS	Late1:OPN	0.001	1000	Yes	0
Mixed Fire	Late1:CLS	Late1:OPN	0.002	500	Yes	0
Replacement Fire	Late1:CLS	Early1:ALL	0.002	500	Yes	0
Insects or Disease	Late1:CLS	Early1:ALL	0.002	500	Yes	0

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