LANDFIRE Biophysical Setting Model

Biophysical Setting **0911670** **Rocky Mountain Poor-Site Lodgepole Pine Forest**

☐ *This BPS is lumped with:*
☐ *This BPS is split into multiple models:*

General Information

Contributors (also see the Comments field) **Date** 4/15/2006

Modeler 1	Gregg Riegel	griegel@fs.fed.us	**Reviewer**	Jim Merzenich	jmerzenich@fs.fed.us
Modeler 2	Amy Waltz	awaltz@tnc.org	**Reviewer**	Jimmy Kagan	jimmy.kagan@oregonstate.edu
Modeler 3	Louisa Evers	Louisa_Evers@or.blm.gov	**Reviewer**	Norm Michaels	nmichaels@fs.fed.us

Vegetation Type

Forest and Woodland

General Model Sources

☑ Literature
☑ Local Data
☑ Expert Estimate

Dominant Species

PICO
PUTR2
FEID
ARUV
ACOC
CARO

Map Zone

9

Model Zone

☐ Alaska
☐ California
☐ Great Basin
☐ Great Lakes
☐ Hawaii
☐ Northeast
☐ Northern Plains
☐ N-Cent.Rockies
☑ Pacific Northwest
☐ South Central
☐ Southeast
☐ S. Appalachians
☐ Southwest

Geographic Range

Lodgepole pine forest on deep Mazama ash and pumice east of the Cascades in OR. This area is dominated by self-replacing stands of non-serotinous lodgepole pine (Pinus contorta var. murryana) making it a distinctive from lodgepole pine stands ocurring elsewhere.

Biophysical Site Description

This forest type is generally on two settings: 1) low thermal capacity soils derived primarily from pumice and 2) topographic depressions and river valleys with high water tables. Both settings generally occur between 1200 to 1600 m elevation. This forest type is generally restricted to the "pumic plateau" region characterized by internally drained topographic depressions, gentle slopes and isolated cinder cones. Soils are poorly structured Andisols (A/C horizon) with low bulk density and subject to wide diurnal temperature changes.

Vegetation Description

Generally single-layed forest canopy dominated by lodgepole pine. Multi-canopy stand types can occur locally where moderate to light fires, windthrow or other canopy disturbance create open conditions. Ponderosa pine, white fir, western white pine, and aspen can be associated with these forests under specific habitat conditions related to soil moisture. Franklin and Dyrness (1988) recognize 8 plant communities where lodgepole pine is the dominant tree species. Understory species characterizing these communities follow a moisture gradient from dry (dominated by Purshia tridentada) to wet (dominated by grasses and sedges).

**Fire Regime Groups are: I: 0-35 year frequency, surface severity; II: 0-35 year frequency, replacement severity; III: 35-100+ year frequency, mixed severity; IV: 35-100+ year frequency, replacement severity; V: 200+ year frequency, replacement severity.

Disturbance Description

This type is driven by moderate to high severity (stand replacing) fires. Fire-scarred trees tend to be more susceptible to beetle attack and blue stain fungi-induced mortality leading to cyclic-succession that includes these three disturbance agents. Windthrow can also be both locally important (creating canopy gaps), and regionally important (leading to the "unraveling" of the forest canopy). Both conditions promote the self-replacement of lodgepole pine in this forest type. Windthrow may also contribute to local regeneration by promoting favorable micro-climate and local soils conditions. Self-thining is an important process during the early successional stage of this forest type.

Adjacency or Identification Concerns

The pumice lodgepole pine forests are adjacent to dry ponderosa pine (mesic), mixed ponderosa pine, and juniper steppe.

Native Uncharacteristic Conditions

Scale Description

The lodgepole pine pumice ecosystem is dominated by large-scale fire and insect outbreaks. Windthrow can be an important factor modifying canopy conditions and regeneration success in the absence of fire and variable depending on local topography. Microsite conditions are important to successful regeneration where soil moisture is low. Topographic depressions may be important to the separation of lodgepole pine and ponderosa pine near the transition of these forest types as a result of cold air drainage favoring lodgepole pine.

Issues/Problems

Fire history is poorly described in the literature but can be more accurately determined by age structure than most forest types.

Jim Merzenich brought up the discussion on the historic vs. present extent of Ponderosa grasslands. This discussion includes other Rapid Assessment pine models (R#PIPOm, R#PIPOxe). He suggests that one of these models should include large extent of Ponderosa grassland. It was suggested that the current area in this type may be a significant extension of the historic extent due to fire suppression and grazing (Munger, 1914) - that, according to GLO records, much of this area was more of a ponderosa savanah.

Comments

Much of the descriptions in this BpS model for zones 7, 9 and 1 originated from the Rapid Assessment R#PICOpu PNVG. However, the current model has been extensively modified by the current authors and with input from experts in the Chemult RD and on the Winema NF. Originally, the modelers built a 5-box model, but later agreed to simplify to a 3-box due to detection limitations.

Vegetation Classes

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Class A **25 %**

Early Development 1 All Structure

Upper Layer Lifeform

- [ ] Herbaceous
- [ ] Shrub
- [x] Tree

Fuel Model

Indicator Species and Canopy Position

PICO
Upper

Structure Data (for upper layer lifeform)

	Min	Max
Cover	0 %	80 %
Height	Tree 0m	Tree 10m
Tree Size Class	Sapling >4.5ft; <5"DBH	

- [ ] Upper layer lifeform differs from dominant lifeform.

Description

Dense post-fire stands (may exceed 10,000 stems/ha). Tree size is small (< 10 cm DBH) and ages vary from (< 20 to > 40yrs) depending on environmental conditions. Regeneration and understory plants are rare. Self-thinning is the predominant process leading to changes in stand structure and leads to high levels of fine to 10 hour fuels. However, these stands rarely burn and can act as fire barriers.

Succession to class B after 20yrs. Replacement fire resets to time zero (MFRI 100yrs). A small percentage of this BpS is so dry that it only ever develops open canopy class C (probability 0.08).

Class B **55 %**

Late Development 1 Closed

Upper Layer Lifeform

- [ ] Herbaceous
- [ ] Shrub
- [x] Tree

Fuel Model

Indicator Species and Canopy Position

PICO
Upper

Structure Data (for upper layer lifeform)

	Min	Max
Cover	41 %	85 %
Height	Tree 10.1m	Tree 25m
Tree Size Class	Medium 9-21"DBH	

- [ ] Upper layer lifeform differs from dominant lifeform.

Description

Lodgepole (>10cm to <50cm DBH) generally <40yrs, but older stands can be greater than 100yrs. before bark beetles attack older trees and open up the stand. These trees may be 25-30ft tall, but taller in protected microhabitats.

Succession to class C after 40yrs. Replacement fire MFRI 33yrs. Insect/disease (annual probability = 0.01; 100yr return) opens up to class C.

Class C **20 %**

Late Development 1 Open

Upper Layer Lifeform

- [ ] Herbaceous
- [ ] Shrub
- [x] Tree

Fuel Model

Indicator Species and Canopy Position

PICO
Upper
LUPIN
Lower
RICE
Lower

Structure Data (for upper layer lifeform)

	Min	Max
Cover	0 %	40 %
Height	Tree 10.1m	Tree 25m
Tree Size Class	Medium 9-21"DBH	

- [ ] Upper layer lifeform differs from dominant lifeform.

Description

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These stands show open canopy conditions of mature lodgepole resulting from insect-induced tree mortality and/or windthrow or low regeneration. They can be 40 to 80yrs, and some stands hold together up to 150yrs or more. These are often part of a cyclic pattern of succession involving post-fire stands experiencing a second burn followed by insect outbreaks and windthrow. These trees may be 30-40ft tall.

Replacement fire MFRI 30yrs. Insect/disease (annual probability = 0.02; 50yr return) resets to class A.

Class D **0 %**

[Not Used] [Not Used]

Upper Layer Lifeform

☐ Herbaceous
☐ Shrub
☐ Tree

Fuel Model

Indicator Species and Canopy Position

Structure Data (for upper layer lifeform)

	Min	*Max*
Cover	%	%
Height		
Tree Size Class		

☐ Upper layer lifeform differs from dominant lifeform.

Description

Class E **0 %**

[Not Used] [Not Used]

Upper Layer Lifeform

☐ Herbaceous
☐ Shrub
☐ Tree

Fuel Model

Indicator Species and Canopy Position

Structure Data (for upper layer lifeform)

	Min	*Max*
Cover	%	%
Height		
Tree Size Class		

☐ Upper layer lifeform differs from dominant lifeform.

Description

Disturbances

Fire Regime Group:** IV

Historical Fire Size (acres)

Avg
Min
Max 1000

Sources of Fire Regime Data

☑ Literature
☑ Local Data
☑ Expert Estimate

Fire Intervals

	Avg FI	*Min FI*	*Max FI*	*Probability*	*Percent of All Fires*
Replacement	40	20	200	0.025	100
Mixed					
Surface					
All Fires	40			0.02502	

Fire Intervals (FI):

Fire interval is expressed in years for each fire severity class and for all types of fire combined (All Fires). Average FI is central tendency modeled. Minimum and maximum show the relative range of fire intervals, if known. Probability is the inverse of fire interval in years and is used in reference condition modeling. Percent of all fires is the percent of all fires in that severity class.

Additional Disturbances Modeled

☑ Insects/Disease ☐ Native Grazing ☐ Other (optional 1)
☐ Wind/Weather/Stress ☐ Competition ☐ Other (optional 2)

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