Rapid Assessment Reference Condition Model

The Rapid Assessment is a component of the LANDFIRE project. Reference condition models for the Rapid Assessment were created through a series of expert workshops and a peer-review process in 2004-2005. For more information, please visit www.landfire.gov. Please direct questions to helpdesk@landfire.gov.

Potential Natural Vegetation Group (PNVG):

R#PICOpu **Lodgepole Pine - Pumice Soils**

General Information

Contributors *(additional contributors may be listed under "Model Evolution and Comments")*

Modelers		Reviewers	
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Vegetation Type

Forested

Dominant Species*

Pico
Putr
Feid
Aruv

General Model Sources

- [x] Literature
- [x] Local Data
- [x] Expert Estimate

LANDFIRE Mapping Zones

1 2 7 8 9

Rapid Assessment Model Zones

- [ ] California
- [ ] Great Basin
- [ ] Great Lakes
- [ ] Northeast
- [ ] Northern Plains
- [ ] N-Cent.Rockies
- [x] Pacific Northwest
- [ ] South Central
- [ ] Southeast
- [ ] S. Appalachians
- [ ] Southwest

Geographic Range

Lodgepole pine forest of south central Oregon occupy areas deeply buried by Mazama ash and pumice east of the central and southern Cascades of Oregon. This area is dominated by self-replacing stands of non-sertotinous lodgepole pine making it a distinctive forest type for the seral lodgepole pine stands occurring under different regional environmental conditions.

Biophysical Site Description

This forest type is generally considered to consist of two climax stages: 1) an "edaphic climax" occurring on nutrient poor, low thermal capacity soils derived primarily from Mazama ash and pumice deposited ca. 6700 YBP, and 2) a less common tope-edaphic stand type associated with topographic depressions and river valleys. Both forest types generally occur between 1200 to 1600 m elevation. This forest type is generally restricted to the "pumice plateau" region characterized by internally drained topographic depressions, low angle slopes and isolated cinder cones. Similar conditions can also be present in other areas of central and eastern Oregon but are generally a minor component of the local forests. Aspect in the plateau area varies primarily due to drainage systems and slopes associated with cinder cones. Soils for the pumice lodgepole pine forests are poorly structured Andisols (A/C horizon) with fine-textured, low bulk density and low nutrient status. The edaphic forest type is associated with well-drained, low soil moisture capacity soils. Poor drainage can characterize depression soils where understory species include Festuca idahoensis and Carex rossi.

Vegetation Description

Generally single-layer forest canopy dominated by lodgepole pine. Multi-canopy stand types can occur locally where disturbance, 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

*Dominant and Indicator Species are from the NRCS PLANTS database. To check a species code, please visit http://plants.usda.gov.

communities follow a moisture gradient from dry (dominated by the shrub Purshia tridentada) to wet (dominated by grasses and sedges).

Disturbance Description

Moderate to high severity (stand replacing) fires with a MFRI of 60 to 100+ years. 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-thinning 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 the following forest types: dry ponderosa pine (mesic), mixed ponderosa pine, and juniper steppe.

Scale Description

Sources of Scale Data ☑ Literature ☑ Local Data ☑ Expert Estimate

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 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 savannah.

Model Evolution and Comments

In Classes C and D, the alternative succession represents the in-filling to a closed canopy state as a result of regeneration.

Succession Classes

Succession classes are the equivalent of "Vegetation Fuel Classes" as defined in the Interagency FRCC Guidebook (www.frcc.gov).

Class A 20 %

Early1 All Structures

Description

Dense post-fire stands (may exceed 10,000 stems/ha). Tree size is small (< 10 cm dbh) and ages vary from (< 20 to > 40 years) 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 40 years. Replacement fire resets to time zero (MFRI 1000 years). A small percentage of this PNVG is so dry that it only ever develops open canopy class D (probability 0.01).]

Indicator Species* and Canopy Position

Pico

Structure Data (for upper layer lifeform)

	Min	*Max*
Cover	10 %	85 %
Height	no data	no data
Tree Size Class	no data	

Upper Layer Lifeform

- ☐ Herbaceous
- ☐ Shrub
- ☐ Tree

Fuel Model no data

☐ Upper layer lifeform differs from dominant lifeform. Height and cover of dominant lifeform are:

Class B 15 %

Mid1 Closed

Description

Lodgepole (>10 cm - < 50 cm dbh) generally less than 40 to 80 years. Regeneration patterns reflect canopy structure, i.e., gap size and density but is generally low. [Succession to class E after 40 years. Replacement fire MFRI 100 years. Mixed fire MFRI 60-70 years opens the stand up to class C. Other factors (windthrow, insect/disease, low regeneration) open the stand to class C, also (Option; probability 0.0275).

Indicator Species* and Canopy Position

Pico

Structure Data (for upper layer lifeform)

	Min	*Max*
Cover	40 %	85 %
Height	no data	no data
Tree Size Class	no data	

Upper Layer Lifeform

- ☐ Herbaceous
- ☐ Shrub
- ☐ Tree

Fuel Model no data

☐ Upper layer lifeform differs from dominant lifeform. Height and cover of dominant lifeform are:

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Class C 50 %

Mid1 Open

Description

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 80 years, and are often part of a cyclic pattern of succession involving post-fire stands experiencing a second burn followed by insect outbreaks and windthrow. [Succession to class C after 110 years. Replacement fire MFRI 100 years. Alternate succession probability 0.01 allows the stand to fill in to class B.]

Indicator Species* and Canopy Position

Pico

Structure Data (for upper layer lifeform)

	Min	Max
Cover	10 %	40 %
Height	no data	no data
Tree Size Class	no data	

Upper Layer Lifeform

- ☐ Herbaceous
- ☐ Shrub
- ☐ Tree

☐ Upper layer lifeform differs from dominant lifeform. Height and cover of dominant lifeform are:

Fuel Model no data

Class D 10 %

Late1 Open

Description

Open mature stand conditions reflecting low establishment rates under dry environmental conditions. Lupine and some wax current are common species under these 80 to 150 year old stands. [Maintains in class D. Replacement fire MFRI 100 years. A small portion may eventually close in to class E (probability 0.01).]

Indicator Species* and Canopy Position

Pico

Structure Data (for upper layer lifeform)

	Min	Max
Cover	10 %	40 %
Height	no data	no data
Tree Size Class	no data	

Upper Layer Lifeform

- ☐ Herbaceous
- ☐ Shrub
- ☐ Tree

☐ Upper layer lifeform differs from dominant lifeform. Height and cover of dominant lifeform are:

Fuel Model no data

Class E 5 %

Late1 Closed

Description

Mature lodgepole (>10 cm - < 50 cm dbh) average 30 cm, and are generally 120-150 years. Regeneration patterns reflect canopy structure, (i.e., gap size and density) but is generally low. At this stage, the stands may show some bark beetle outbreaks that

Indicator Species* and Canopy Position

Pico

Structure Data (for upper layer lifeform)

	Min	Max
Cover	40 %	80 %
Height	no data	no data
Tree Size Class	no data	

Upper Layer Lifeform

- ☐ Herbaceous
- ☐ Shrub
- ☐ Tree

☐ Upper layer lifeform differs from dominant lifeform. Height and cover of dominant lifeform are:

Fuel Model no data

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impact the older trees and open up the stand. [Maintains in class E. Replacement fire MFRI 100 years. Insect/Disease may open up the stand to class C (prob. 0.025).]

Disturbances

Non-Fire Disturbances Modeled

- [x] Insects/Disease
- [ ] Wind/Weather/Stress
- [ ] Native Grazing
- [ ] Competition
- [x] Other: Other factors: windthrow, insect/disease, low regeneration
- [ ] Other:

Fire Regime Group: 4

I: 0-35 year frequency, low and mixed severity
II: 0-35 year frequency, replacement severity
III: 35-200 year frequency, low and mixed severity
IV: 35-200 year frequency, replacement severity
V: 200+ year frequency, replacement severity

Historical Fire Size (acres)

Avg:
Min:
Max:

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 the 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. All values are estimates and not precise.

Sources of Fire Regime Data

- [x] Literature
- [x] Local Data
- [x] Expert Estimate

	Avg FI	*Min FI*	*Max FI*	*Probability*	*Percent of All Fires*
Replacement	125	65	200	0.008	78
Mixed	450			0.00222	22
Surface					
All Fires	98			0.01023	

References

Agee, J.K. 1993. Fire Ecology of Pacfic Northwest Forests. Island Press, Washington, D.C.

Franklin, J.F. and Dyrness, C.T. 1988. Natural Vegetation of Oregon and Washington. Second Edition. Oregon State University Press, Corvallis, Oregon.

Geiszler, D.R., Gara, R.I., Driver, C.H., Gallucci, B.F., and Martin, R.E. 1980. Fire, fungi, and beetle influences on a lodgepole pine ecosystem in south-Central Oegon. Oecologia 46:239-243.

Munger, Thornton T. 1914. Replacement of yellow pine by lodgepole pine on the pumice soils of central Oregon. Proceedings of the Society of American Foresters. 9(3): 396-406.

Stuart, J.D., Agee, J.K., and Gara, R.I. 1989. Lodgepole pine regeneration in an old, self-perpetuating forest in south-central Oregon. Canadian Journal of Forest Research 19:1096-1104.

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