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 and 2005. For more information, please visit www.landfire.gov. Please direct questions to helpdesk@landfire.gov.

Potential Natural Vegetation Group (PNVG)

R2PIPO   **Interior Ponderosa Pine**

General Information

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

Modelers		**Reviewers**	
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Vegetation Type
Forested

Dominant Species*
PIPO
FEID
ARNO
QUGA

General Model Sources
☑ Literature
☐ Local Data
☐ Expert Estimate

LANDFIRE Mapping Zones
12   17
13   18
16

Rapid AssessmentModel Zones

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

Geographic Range

Ponderosa pine is widely distributed throughout North America occupying about 38 million acres across 14 states. Interior ponderosa pine is much more restricted than the ponderosa pine/dry mixed conifer (Douglas fir) type in the Great Basin. Interior ponderosa pine is typically found in the southern and eastern Uinta Mountains in northern UT. Ponderosa pine is found along the east side of the Sierra Nevada Range, with a remnant patch around the Mount Charleston area (near Las Vegas, NV) above 6000 feet, and in the central and eastern side of Nevada along mountain ranges where mixed conifers are absent or uncommon. Ponderosa pine covers plateaus and mountains in the southern and central portion of Utah (Bradley et al. 1992).

Biophysical Site Description

This type occurs at elevations ranging from 5,500 (waterways) to 8,900 feet (FEIS), however occurrence is generally above 8,000 feet in eastern Nevada. In southern NV, interior ponderosa pine will be found above 6,000 ft, often where mixed conifers are uncommon or absent. Ponderosa pine is the climax dominant on relatively warm, dry sites. In the northern zones of the Great Basin, ponderosa pine is limited to areas with adequate moisture in the early growing season.

Vegetation Description

This PNVG is associated with several species throughout the Great Basin. Many stands have shrub-dominated understories, unlike the common ponderosa pine/bunchgrass habitat types found in neighboring Arizona. Associates/phases include greenleaf manzanita, black sagebrush, elk sedge, mountain-mahogany, Idaho fescue-greenleaf manzanita, Idaho fescue-big sagebrush, Idaho fescue, mountain muhly, antelope bitterbrush, Gambel oak, and mountain snowberry (Bradley et al. 1992).

This PNVG is characterized by open, park-like stands; typically the dominant structural stage on the landscape. Understories may be grass- or shrub-dominant. Closed canopy conditions occur where fire has not been present for many years.

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

Disturbance Description

Under presettlement conditions, interior ponderosa pine forests were subject to frequent, low severity, fires (Fire Regime Group 1) (Bradley et al. 1992). Mean fire return interval for this type ranged from 7-25 years. Mean FRI is 8-10 years for surface fire, with shorter intervals is more open stands. The mean FRI for mixed severity fires is 50 (closed stands) to 80 years (open stands). Replacement fire is rare, but more frequent in closed stands (FRI of 250 yrs), which is less common in the landscape, than in open stands (FRI of 800 yrs).

Dwarf-mistletoe is a serious disease agent of interior ponderosa pine. Stands that have had partial cuts or mountain pine beetle attack are most susceptible to infections (Howard 2003). Mountain pine beetle is the most serious pest in the Black Hills and the central and southern Rocky Mountains. Epidemic outbreaks are usually associated with large (>6-inch diameter), stressed trees in overcrowded stands (Howard 2003).

Adjacency or Identification Concerns

Found adjacent to Gambel or shrub live oak (Quercus turbinella), pinyon-juniper, mixed conifers, interior chaparral, and blackbrush.

This PNVG may be similar to the PNVG R0PIPOnr from the Northern and Central Rockies model zone.

Scale Description

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

In 1631, a fire burned an area of approximately 30 to 40 square kilometers. Golblum and Veblen (1992) reported larger fires were of similar size to those observed at Cheesman Lake (Kaufmann et al. 2000). At Zion National Park roughly 1000 acres burned every three years (West and Madany 1981).

Issues/Problems

This interior ponderosa pine model should be better researched for the Great Basin. Many scattered PIPO patches in the Great Basin were completely logged during the mining era of 1850-1900 (e.g., several 100 acres in the Clover Mountains on the Great Basin-Mojave Desert boundary in eastern NV). It is not well understood how ponderosa pine survived fire with chaparral understories (e.g., many areas on Mount Charleston and in the Clover Mountains), thus leading some to suggest stand replacement as the dominant fire regime with boulders and rugged topography providing fire-safe zones. It is also thought that the dominance of shrubs in understories is greater today than during pre-settlement because livestock grazing greatly reduced grasses in the southern portion of the Great Basin.

Model Evolution and Comments

This model was initially the result of merging two PNVGs (PIPO2 and PIPO 5). The model was developed by modifying the PIPO2 VDDT model. The model was further modified using the comprehensive review from one expert. Literature shows that up to two variations of ponderosa pine occur in the Great Basin (in particular NV--var. ponderosa). However, PIPO does not appear to be a dominant cover type in NV, except in isolated locations.

This model does not take into account insect, disease, wind, weather, and/or stress. None of the modelers felt comfortable describing the historical impact of these disturbances.

Modelers also included: Lynn Bennet (lmbennet@fs.fed.us); John Foster (jfoster@tnc.org)

Succession Classes**

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

Class A   5 %

Early1 PostRep

Description

Graminoid dominated community following stand replacement fire. Sprouting shrubs on more moist site can occur. Conifer seedlings are scattered throughout, but are typically found in dog-hair type thickets.
Age class: 0-15 years. D.B.H. range of 0-2". Succession to B, mid-development closed. Because of the dominance of young trees, replacement fire is surface fire. Therefore, the FRI is 10 yrs (long FRI post-fire) with succession setback by 15 years.

Dominant Species* and Canopy Position

 PIPO
 FEID
 ARNO4
 QUGA

Upper Layer Lifeform
☐ Herbaceous
☐ Shrub
☐ Tree

Fuel Model no data

Structure Data (for upper layer lifeform)

	Min	Max
Cover	0 %	30 %
Height	no data	no data
Tree Size Class	no data	

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

Class B   5 %

Mid1 Closed

Description

>30% canopy cover from sapling to pole size pine. Understory species decreasing to depressed. D.B.H. range of 2-14". Age class: 15 - 100 years. Succession to E, late-development closed state, unless replacement fire (mean FRI of 250 yrs) returns vegetation to state A or mixed severity fire (FRI of 50 yrs) causes a transition to the mid-development open condition (state C). Surface fire is not assumed possible in this closed condition as any fire would at least cause mixed severity fire effects.

Dominant Species* and Canopy Position

 PIPO
 QUGA

Upper Layer Lifeform
☐ Herbaceous
☐ Shrub
☐ Tree

Fuel Model no data

Structure Data (for upper layer lifeform)

	Min	Max
Cover	31 %	99 %
Height	no data	no data
Tree Size Class	no data	

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

Class C   10 %

Mid1 Open
Description

<30% canopy cover of pole to saw timber size trees with diverse understory of grasses or shrub species. Open structure maintained by low intensity and mixed severity fire. D.B.H. range of 2-14". Age class: 16 - 98 years. Replacement fire is infrequent in the open condition (average FRI of 800 yrs). Surface fire (FRI of 10 yrs) and mixed severity fire (FRI of 80 yrs) maintain the open structure of the stand and prevent closure of the vegetation (transition back to B in the absence of fire for 25 yrs). Therefore, vegetation succeeds to late development open
after 84 yrs with fire activity.

Dominant Species* and Canopy Position

PIPO

QUGA

Upper Layer Lifeform
☐ Herbaceous
☐ Shrub
☐ Tree

Fuel Model no data

Structure Data (for upper layer lifeform)

	Min	Max
Cover	10 %	30 %
Height	no data	no data
Tree Size Class	no data	

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

Class D   75 %

Late1 Open
Description

<30% canopy cover with scattered trees saw timber size trees throughout, creating a savanna-like appearance with diverse shrub or grass species dominating the understory.
D.B.H. range of 14+". Age class: 100 + years old. Replacement fire is infrequent in this condition (every 800 yrs). Compared to other classes, surface fire is at its most frequent rate (mean FRI of 8 yrs) and mixed severity fire (mean FRI of 80 yrs) is at its least frequent rate in class D. Fire prevents the transition to a closed structure (E), which happens after 50 yrs without fire. Otherwise, the vegetation will remain in class D indefinitely.

Dominant Species* and Canopy Position

PIPO

QUGA

Upper Layer Lifeform
☐ Herbaceous
☐ Shrub
☐ Tree

Fuel Model no data

Structure Data (for upper layer lifeform)

	Min	Max
Cover	10 %	30 %
Height	no data	no data
Tree Size Class	no data	

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

Class E   5 %

Late1 Closed
Description
>30% canopy cover of decadent trees. Severely suppressed to poorly developed understory. Age class: 100+ years. D.B.H. Range of 14+". Replacement fire will return vegetation to class A (mean FRI of 250 yrs), whereas mixed severity (FRI of 50 yrs) will open stand structure and cause a transition to class D. Without fire, the stand remains closed indefinitely.

Dominant Species* and Canopy Position
PIPO
PSEUD
ABCO
QUGA

Upper Layer Lifeform
☐ Herbaceous
☐ Shrub
☐ Tree

Fuel Model no data

Structure Data (for upper layer lifeform)

	Min	Max
Cover	31 %	99 %
Height	no data	no data
Tree Size Class	no data	

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

Disturbances

Disturbances Modeled
☑ Fire
☑ Insects/Disease
☐ Wind/Weather/Stress
☐ Native Grazing
☐ Competition
☐ Other:
☐ Other

Historical Fire Size (acres)
 Avg: no data
 Min: no data
 Max: no data

Sources of Fire Regime Data
☑ Literature
☐ Local Data
☑ Expert Estimate

Fire Regime Group: 1
 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

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. All values are estimates and not precise.

	Avg FI	Min FI	Max FI	Probability	Percent of All Fires
Replacement	161	250	800	0.00621	5
Mixed	80	50	80	0.0125	10
Surface	9	8	10	0.11111	86
All Fires	8			0.12982	

References

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