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)

R0PIPOnr Ponderosa Pine Northern and Central Rockies

General Information

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

Modelers		Reviewers	
Tonja Opperman	tsopperman@fs.fed.us	Steve Barrett	sbarrett@mtdig.net
Lynnette Morelean	lmorelan@fs.fed.us	Cathy Stewart	cstewart@fs.fed.us
		Jane Kapler Smith	jsmith09@fs.fed.us

Vegetation Type

Forested

Dominant Species*

PIPO
FEID

General Model Sources

- ☐ Literature
- ☐ Local Data
- ☐ Expert Estimate

LANDFIRE Mapping Zones

10 21
19 22
20 29

Rapid AssessmentModel Zones

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

Geographic Range

Throughout the northern and central Rocky Mountains in Montana, northern Idaho, and west-central Wyoming. In Idaho, the distribution of this PNVG is limited.

Biophysical Site Description

These stands typically occurred on hot, dry, south and west-facing slopes at lower elevations with well drained soils and gentle to moderately steep slopes.

Vegetation Description

Vegetation is characterized by Pfister et al. (1977) as the ponderosa pine series, and ponderosa pine will often be the only tree species present. However, a frequent fire regime could maintain seral ponderosa pine stands on additional adjacent sites, characterized by Pfister as Douglas-fir or grand fir series. Fischer and Bradley (1987), Fischer and Clayton (1983), and Smith and Fischer (1997) would characterize these as predominantly Fire Groups 2 and 4 for western Montana, Fire Group 3 for eastern Montana and Wyoming, and Fire Group 1 for Northern Idaho.

Frequent fires promoted a grass-dominated understory with sparse shrubs and a ponderosa pine overstory. Douglas-fir and Rocky Mountain juniper may occur as accidental individuals, but overall Douglas-fir cover will be less than 10%. Common snowberry, antelope bitterbrush, and chokecherry are important shrubs, and mountain mahogany may also occur on rocky outcrops. Grasses may include Idaho and rough fescue (Fischer and Bradley 1987). More mesic shrubs may be present if it is a wetter habitat type that historically maintained an open stand via frequent fire.

Disturbance Description

Frequent, non-lethal surface fires were the dominant disturbance factor, occurring every 3 to 30 years (Arno and Petersen 1993, Arno 1976, Fischer and Bradley 1987). Three-year fire return intervals are likely very localized and associated with Native American burning. More median fire return intervals were likely about

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

15 years. Mixed-severity fires likely occurred about every 50 years; again, depending on the vegetative state. Stand-replacement fires likely occurred in stands and small patches on the order of a few hundred acres every 300-700 years depending on the vegetative state. Some authors note that little information is available regarding the exact nature of stand replacement fire severity in this PNVG.

Bark beetles will affect areas with denser canopy cover of ponderosa pine (e.g., when basal area exceeds 120 sq. ft.) Western pine beetle can attack large ponderosa pine in any canopy density.

Adjacency or Identification Concerns

These sites typically formed the lower timberline in the area and were historically found adjacent to grasslands and shrublands that dominated valley bottoms.

In the 21st century, after missing several fire return intervals, these stands may support an overabundance of stagnant ponderosa pine pole thickets, heavy duff and litter layers, and few grasses or shrubs. Dense pockets of Douglas-fir may also occur on microsites. This PNVG may be found on several different habitat types depending on the local fire regime; FRG I maintained these stands as ponderosa pine, but today they may be supporting a variety of shade-tolerant conifers. If your landscape of interest was maintained by another FRG, use a different PNVG.

This PNVG may be similar to the PNVG R2PIOPO from the Great Basin model zone.

Scale Description

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

Stands dominated by ponderosa pine with frequent fire return intervals commonly exhibit very small patch sizes even though fire events occurred over hundreds or thousands of acres (Agee 1998). Open, late-seral stands typically dominated the landscape with frequent fire, though even-aged stands were uncommon. In Idaho, this type was often found as a narrow band between grassland/shrublands at lower elevations and Douglas-fir types at higher elevations.

Issues/Problems

Fischer and Bradley (1987) show only a single pathway from the dense pole stage characterized by succession without a fire disturbance (Class A to Class B). However, it seems that under a frequent fire regime, these stands would typically bypass Class B and move directly to Class C--unless there is not enough fuel to carry fire at this stage until there is sufficient stand density and leaf litter. 2) Mixed-severity and stand-replacement fire return intervals are not well documented in the literature for this PNVG. Some evidence suggests these fires indeed occurred, but there may be room to improve the assumptions used in this modeling effort. 3) There was some debate in the in-workshop peer review over the probability of mixed fire. Currently the model shows a fire interval of about 70 years for mixed severity fire; some thought it should be more like 50.

Model Evolution and Comments

Peer review incorporated on 4/6/2005. The peer-review process resulted in lumping two original ponderosa pine models together-- one for Idaho and one for Montana (these were originally called PPIN1 and PPIN2 during the June 2004 workshop; were later renamed to R0PIPOdy and R0PIPO to adhere to Rapid Assessment naming conventions; and has subsequently been renamed R0PIPOnr to identify the lumped type). To lump the two types, the descriptions were generally combined and in VDDT, the attributes for fire in the R0PIPOdy model were replaced with the attributes for fire from R0PIPO.

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

Fire-maintained grass/forb and/or seedlings and saplings. Largest size class would be about 6" diameter trees; no very large or old-growth trees would be present in patches of 10s to 100s of acres to be counted in this class. Seedlings among large or very large trees should be counted in class B or C depending on percent cover.

Dominant Species* and Canopy Position

FEID
AGSP
PIPO

Upper Layer Lifeform

☐ Herbaceous
☐ Shrub
☐ Tree

Fuel Model no data

Structure Data (for upper layer lifeform)

	Min	Max
Cover	0 %	100 %
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

Closed PIPO pole stand; may have Douglas-fir as accidentals. Larger, old-growth trees may be present in this class, but the regeneration in the 4-18" diameter size class occurring between these large trees is what should be counted for this class. May see large dead snags as poles compete on the site. Stagnant pole stands are counted here; may see insect/disease here.

Dominant Species* and Canopy Position

PIPO
FEID
AGSP
PSME

Upper Layer Lifeform

☐ Herbaceous
☐ Shrub
☐ Tree

Fuel Model no data

Structure Data (for upper layer lifeform)

	Min	Max
Cover	40 %	100 %
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 20 %

Mid1 Open

Description

Open PIPO pole stand that may have Douglas-fir as accidentals. Larger, old-growth trees may be present in this class, but the 4-18" diameter regeneration between these trees is what should be counted for this class. These patches have probably had recent fire or are drier in order to retain the more open condition.

Dominant Species* and Canopy Position

PIPO
FEID
AGSP

Upper Layer Lifeform

☐ Herbaceous
☐ Shrub
☐ Tree

Fuel Model no data

Structure Data (for upper layer lifeform)

	Min	Max
Cover	0 %	40 %
Height	no data	no data
Tree Size Class	no data	

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

---

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

Class D 60 %

Late1 Open

Description

Classic fire-maintained open, park-like PIPO; nearly any fire maintains; Douglas-fir may be seen as accidentals or in patches, but not a major component of the overstory. Understory is dominated by grasses and is relatively open. Seedlings are very infrequent, with less than 10% cover.

Dominant Species* and Canopy Position

PIPO
FEID
AGSP
SYAL

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 E 10 %

Late1 Closed

Description

Crowded, decadent, two or multi-story PIPO stand; may see Douglas-fir on microsites. Thickets of pole size trees, large trees, and old-growth may be interspersed with large snags.

Dominant Species* and Canopy Position

PIPO
PSME

Upper Layer Lifeform

☐ Herbaceous
☐ Shrub
☐ Tree

Fuel Model no data

Structure Data (for upper layer lifeform)

	Min	*Max*
Cover	30 %	100 %
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	300	100	1000	0.00333	4
Mixed	60	50	200	0.01667	19
Surface	15	3	30	0.06667	77
All Fires	12			0.08667	

References

Agee, J.K. 1988. The landscape ecology of western forest fire regimes. Northwest Science, Vol. 72, Special Issue: p24-34.

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

Arno, S.F. 1980. Forest Fire History in the Northern Rockies. Journal of Forestry 78:8, 460-465.

Arno, S.A. and T.D. Petersen. 1983. Variation in Estimates of fire intervals: a closer look at fire history on the Bitterroot National Forest. Res. Pap. INT-301, Ogden, UT: USDA, Forset Service, Intermountain Forest and Range Experiment Station, 8p.

Barrett, Stephen W. 1984. Fire history of the River of No Return Wilderness: River Breaks Zone. Final Report. Missoula, MT: Systems for Environmental Management. 40 p + appendices.

Barrett, Stephen W. 1993. Fire regimes on the Clearwater and Nez Perce National Forests north-central Idaho. Final Report: Order No. 43-0276-3-0112. Ogden, UT: U.S. Department of Agriculture, Forest Service, Intermountain Research Station, Fire Sciences Laboratory. 21 p. Unpublished report on file with: U.S. Department of Agriculture, Forest Service, Rocky Mountain Research Station, Fire Sciences Laboratory, Missoula, MT.

Barrett, S. W. 2004. Altered fire intervals and fire cycles in the Northern Rockies. Fire Management Today 64(3): 25-29.

Barrett, S. W. 2004. Fire Regimes in the Northern Rockies. Fire Management Today 64(2): 32-38.

Fischer, W.C. and B.D. Clayton. 1983. Fire ecology of Montana forest habitat types east of the Continental Divide. GTR-INT-141.Ogden UT: USDA, Forest Service, Intermountain Research Station, 83p.

Fisher, W.C. and A.F. Bradley. 1987. Fire Ecology of Western Montana Forest Habitat Types. General Technical Report INT-223. Ogden UT: USDA, Forest Service, Intermountain Research Station, 95p.

Habeck, J.R. and R.W. Mutch. 1973. Fire-dependent forest in the northern Rocky Mountains. Quarternary Research 3, 408-424.

Morgan, P. and Parsons, R. 2001, Historical range of variability of forests of the Idaho Southern Batholith Ecosystem. Univerity of Idaho. Unpublished.

Pfister, R.D., B.L. Kovalchik, S.F. Arno, and R.C. Presby. 1977. Forest Habitat Types of Montana. GTR-INT-34. USDA Forest Service, Intermountain Forest and Range Experiment Station, Ogden UT, 174p.

Smith, Jane Kapler; Fischer, William C. 1997. Fire ecology of the forest habitat types of northern Idaho. Gen. Tech. Rep. INT-GTR-363. Ogden, UT: U.S. Department of Agriculture, Forest Service, Rocky Mountain Forest and Range Experiment Station. 142 p.

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