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):

R0WLLPDF **Western Larch, Lodgepole Pine, and Douglas-Fir Mix**

General Information

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

Modelers		Reviewers	
Cathy Stewart	cstewart@fs.fed.us	Steve Barrett	sbarrett@mtdig.net

Vegetation Type

Forested

Dominant Species*

LAOC
PSEUD7
PICO
ABLA

General Model Sources

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

LANDFIRE Mapping Zones

10 21
19 22
20 29

Rapid Assessment Model Zones

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

Geographic Range

Western Montana and northern Idaho, west of the Continental Divide.

Biophysical Site Description

Montane and lower subalpine zones, approximately 3000-6000 feet primarily on north-facing aspects west of the Continental Divide. Lower subalpine sites typically occur as relatively moist subalpine fir habitat types (e.g. ABLA/CLUN) (Pfister et al. 1977).

Vegetation Description

Western larch occurs on more moist/northerly Douglas-fir habitat types and more productive subalpine fir habitat types. Larch is mixed in with seral Douglas-fir, lodgepole pine, or ponderosa pine in the overstory. Long fire intervals promote the development of Engelmann spruce and subalpine fir stands with an increase in root disease. Mountain pine beetles often reduce the lodgepole pine component, possibly promoting mixed severity fires.

Disturbance Description

Fire Regime Group III, with a mean fire return interval of approximately 70 years. Mountain pine beetle will reduce canopy cover of lodgepole pine.

Adjacency or Identification Concerns

Equates with Pfister et al. (1977) moist Douglas-fir and subalpine fir habitat types. It may be difficult to differentiate this PNVG from R0GFLP and R0GFDF, as the three types commonly overlap. The other two PNVGs are limited to grand fir habitat types.

Scale Description

Sources of Scale Data [x] Literature [x] Local Data [x] Expert Estimate

Scale can be in small patches of 50 acres but generally is hundreds to thousands of acres (due to stand replacing fires requiring dry conditions or being wind driven).

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

Issues/Problems

Model Evolution and Comments

Workshop code was WLLPDF.

Split out from old (FRCC Guidebook) SPFI1 and DFIR2. Pure stands of western larch occur in northwest Montana and Northern Idaho, and it occurs in mixed stands on edge of range.

Review comments incorporated on 3/16/2005. As a result of the peer-review process, this type was modified to increase the amount of mixed severity fire to 70% (from 60%) and the age ranges of late-development classes were adjusted to begin at 80 years (from 65 years). The end result was more late-development conditions (E) and more closed conditions (B and E).

Succession Classes

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

Class A 10 %

Early1 PostRep

Description

Young larch and lodgepole establish on site with some Douglas-fir.

Indicator Species* and Canopy Position

LAOC
PSEUD7
PICO
ABLA

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 50 %

Mid1 Closed

Description

Larch, lodgepole and Douglas-fir (poles to medium trees) continue to dominate. Without disturbance, Douglas-fir can increase in understory. Subalpine fir may be present.

Indicator Species* and Canopy Position

LAOC
PSEUD7
PICO
ABLA

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:

---

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

Class C 15 %

Mid1 Open

Description

Larch, with some Douglas-fir, lodgepole, or subalpine fir. Open condition is created by disturbance (fire, insect, or disease), which opens up more closed conditions (i.e., B or E).

Indicator Species* and Canopy Position

LAOC
PSEUD7
PICO
ABLA

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:

Class D 5 %

Late1 Open

Description

Large larch and Douglas-fir, favored by disturbance. Subalpine fir and lodgepole will be reduced or eliminated by fire or insect or disease.

Indicator Species* and Canopy Position

LAOC
PSEUD7
PICO
ABLA

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:

Class E 20 %

Late1 Closed

Description

Large diameter larch and Douglas-fir dominate overstory, subalpine fir is present in the middle and understory. Lodgepole pine will be largely absent.

Indicator Species* and Canopy Position

LAOC
PSEUD7
PICO
ABLA

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:

Disturbances

Non-Fire Disturbances Modeled

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

Fire Regime Group: 3

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

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

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

- ☑ Literature
- ☑ Local Data
- ☑ Expert Estimate

	Avg FI	*Min FI*	*Max FI*	*Probability*	*Percent of All Fires*
Replacement	200	50	250	0.005	33
Mixed	100	20	140	0.01	67
Surface					
All Fires	67			0.01501	

References

Agee, James K. 1993. Fire ecology of Pacific Northwest forests. Island Press, Washington DC, 493 p.

Arno, Stephen F. 2000. Fire in western forest ecosystems. In: Brown, James K.; Smith, Jane Kapler, eds. Wildland fire in ecosystems: Effects of fire on flora. Gen. Tech. Rep. RMRS-GTR-42-vol. 2. Ogden, UT: U.S. Department of Agriculture, Forest Service, Rocky Mountain Research Station: 97-120.

Arno, S.F., H.Y. Smith and M.A. Krebs. 1997. Old growth ponderosa pine and western larch stand structures: influences of pre-1900 fires and fire exclusion. Res. Pap. INT-495. Ogden, UT: US Department of Agriculture, Forest Service, Intermountain Research Station. 20 p.

Arno, Stephen F.; Reinhardt, Elizabeth D.; Scott, Joe H. 1993. Forest structure and landscape patterns in the subalpine lodgepole pine type: A procedure for quantifying past and present stand conditions. Gen. Tech. Rep. INT-294. Ogden, UT: U.S. Department of Agriculture, Forest Service, Intermountain Research Station. 17p.

Arno, S.F. 1980. Forest fire history in the northern Rockies. Journal of Forestry (78): 460-465.

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.

Barrett, Stephen W. 1994. Fire regimes on andesitic mountain terrain in northeastern Yellowstone National Park. International Journal of Wildland Fire 4: 65-76.

Barrett, Stephen W. 1994. Fire regimes on the Caribou National Forest, Southeastern Idaho. Contract final report on file, Pocatello, ID: U.S. Department of Agriculture, Forest Service, Caribou National Forest, Fire Management Division. 25 p.

Barrett, Stephen W. 2002. A Fire Regimes Classification for Northern Rocky Mountain Forests: Results from Three Decades of Fire History Research. Contract final report on file, Planning Division, USDA Forest Service Flathead National Forest, Kalispell MT. 61 p.

Barrett, S. W., S. F. Arno, and J. P. Menakis. 1997. Fire episodes in the inland Northwest (1540-1940) Based on Fire History Data. USDA, Forest Service, Intermountain Research Station. General Technical Report INT-

370.

Barrett, Stephen W., Arno, Stephen F., Key, Carl H. 1991. Fire regimes of western larch-lodgepole pine forests in Glacier National Park, Montana. Canadian Journal of Forest Research 21: 1711-1720.

Brown, James K.; Smith, Jane Kapler, eds. 2000. Wildland fire in ecosystems: effects of fire on flora. Gen. Tech. Rep. RMRS-GTR-42-vol. 2. Ogden, UT: U.S. Department of Agriculture, Forest Service, Rocky Mountain Research Station. 257 p

Brown, James K.; Arno, Stephen F.; Barrett, Stephen W.; Menakis, James P. 1994. Comparing the prescribed natural fire program with presettlement fires in the Selway-Bitterroot Wilderness. International Journal of Wildland Fire 4(3): 157-168.

Davis, K.M., B.D. Clayton and W.C. Fischer. 1980. Fire ecology of Lolo National Forest habitat types. USDA Forest Service, Gen. Tech. Report INT-79, Intermountain Forest and Range Experiment Station. 77 pp.

Eyre, F. H., ed. 1980. Forest cover types of the United States and Canada. Washington, DC: Society of American Foresters. 148 p.

Fischer, W.F. and A.F. Bradley. 1987. Fire ecology of western Montana forest habitat types. USDA Forest Service Gen. Tech. Report INT-223. Intermountain Forest and Range Experiment Station. 94 p.

Hawkes, Brad C. 1979. Fire history and fuel appraisal study of Kananaskis Provincial Park. Thesis, University of Alberta, Edmonton ALTA. 173 p.

Hessburg, Paul F.; Smith, Bradley G.; Kreiter, Scott D.; Miller, Craig A.; Salter, R. Brion; McNicoll, Cecilia H.; Hann, Wendel J. Historical and current forest and range landscapes in the Interior Columbia River Basin and portions of the Klamath and Great Basins. Part I: Linking vegetation patterns and landscape vulnerability to potential insect and pathogen disturbances. Gen. Tech. Rep. PNW-GTR-458. Portland, OR: U.S. Department of Agriculture, Forest Service, Pacific Northwest Research Station. 357 p.

Keane, Robert E., Arno, Stephen F., and Brown, James K. 1990. Simulating cumulative fire effects in ponderosa pine/Douglas-fir forests. Ecology 71(1): 189-203.

Lesica, Peter. 1996. Using fire history models to estimate proportions of old growth forest in Northwest Montana, USA. Biological Conservation 77: 33-39.

Loope, Lloyd L.; Gruell, George E. 1973. The ecological role of fire in the Jackson Hole area, northwestern Wyoming. Quaternary Research 3(3): 425-443.

Peet, R. K. 1988. Forests of the Rocky Mountains. In: M. G. Barbour and W. D. Billings, eds. Terrestrial vegetation of North America. Cambridge: Cambridge University Press. Pp. 64-102

Pfister, R.D., B.L. Kovalchik, S.F. Arno, R.C. Presby. 1977. Forest habitat types of Montana. Gen. Tech. Report INT-34. Ogden, UT:US Department of Agriculture, Forest Service, Intermountain Forest and Range Experiment Station. 174 pp.

Quigley, Thomas M.; Arbelbide, Sylvia J., tech. eds. 1997. An assessment of ecosystem components in the interior Columbia basin and portions of the Klamath and Great Basins: volume 1. Gen. Tech. Rep. PNW-

GTR-405. Portland, OR: U.S. Department of Agriculture, Forest Service, Pacific Northwest Research Station. 4 vol.

Romme, William H. 1982. Fire and landscape diversity in subalpine forests of Yellowstone National Park. Ecological Monographs 52(2): 199-221.

Romme, William H.; Dennis H. Knight. 1981. Fire frequency and subalpine forest succession along a topographic gradient in Wyoming. Ecology 62: 319-326.

Schmidt, Kirsten M, Menakis, James P., Hardy, Colin C., Hann, Wendel J., Bunnell, David L. 2002. Development of coarse-scale spatial data for wildland fire and fuel management. Gen. Tech. Rep. RMRS-GTR-87. Fort Collins, CO: U.S. Department of Agriculture, Forest Service, Rocky Mountain Research Station. 41 p. + CD.

Smith, J.K. and W.C. Fischer. 1997. Fire ecology of the forest habitat types of northern Montana. Gen. Tech. Report INT-GTR-363.USDA, Forest Service, Intermountain Forest and Range Experiment Station. 142 pp.

Steele, Robert; Cooper, Steven V.; Ondov, David M.; Roberts, David W.; Pfister, Robert D. 1983. Forest habitat types of eastern Idaho and western Wyoming. Gen. Tech. Rep. INT-144. Ogden, UT: U.S. Department of Agriculture, Forest Service, Intermountain Mountain Research Station. 122 p.

Tande, Gerald F. 1979. Fire history and vegetation pattern of coniferous forests in Jasper National Park, Alberta. Canadian Journal of Botany 57: 1912-1931.

U.S. Department of Agriculture, Forest Service, Rocky Mountain Research Station, Fire Sciences Laboratory (2002, December). Fire Effects Information System, [Online]. Available: http://www.fs.fed.us/database/feis/ [Accessed 5/22/03].

Wadleigh, L.; Jenkins, Michael J. 1996. Fire frequency and the vegetative mosaic of a spruce-fir forest in northern Utah. Great Basin Naturalist 56: 28-37.