

LANDFIRE Biophysical Setting Model

Biophysical Setting 0910560

**Rocky Mountain Subalpine Mesic-Wet
Spruce-Fir Forest and Woodland**

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

General Information

Contributors (also see the Comments field) **Date** 10/6/2005

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Vegetation Type

Forest and Woodland

General Model Sources

- ☒ Literature
☒ Local Data
☒ Expert Estimate

Dominant Species

ABLA
PIEN
PICO
VAME
CLUN2
LIBO3
LEGL

Map Zone

9

Model Zone

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

Geographic Range

This type occurs in the Blue and Wallowa Mountains in NE OR and SE WA.

Biophysical Site Description

These sites are characterized by mid-elevations to upper timberline (4200-7800ft), cold temperatures and occurrence on a variety of aspects. Soils tend to be relatively deep (>30in depth) on most parent materials but can be shallower (around 20in depth) on colluvium and alluvium.

Vegetation Description

Dominated by subalpine fir and Englemann spruce. Englemann spruce lives longer and is more disease resistant than subalpine fir, but is less tolerant. Englemann spruce can be climax in some riparian zones. Douglas-fir, lodgepole pine and western larch are important species in the sere, with Douglas-fir on drier, warmer sites at lower elevations. Understory indicators include false bugbane, Clintonia, Labrador tea, menziesia and twinflower at lower elevations, and big huckleberry.

Disturbance Description

Fires tend to be replacement events when they occur, since both subalpine fir and Engelmann spruce have little resistance to fire. Root diseases, dwarf mistletoe and (especially) bark beetles are important disturbance agents.

Adjacency or Identification Concerns

This type occurs adjacent to 1047 (moist mixed conifer) at low elevations and 1055 (dry-mesic subalpine fir) on droughty sites and windswept high elevations. Subalpine fir also occurs in MZ01 within the Pacific Northwest Region.

**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.

Native Uncharacteristic Conditions

Scale Description

The BpS can cover hundreds or thousands of acres, and fires can cover a large area, too, once initiated.

Issues/Problems

Local experts should review and correct as necessary. There should be some discussion as to whether the MZ01 and MZ08 models should be the same.

Comments

As a result of national QC in MZ09, the deterministic transition from D to B was changed to D to D because the original transition caused the ages to NOT line up along the main successional pathway, violating a LANDFIRE modeling rule. This changed the percentage of the landscape in each class from 20%, 20%, 35%, 20% and 5% in classes A through E respectively to 20%, 10%, 40%, 25% and 5% in classes A through E respectively.

Tom DeMeo assisted with the model development. We started model development with the same values as for the Rocky Mountain spruce-fir, but here there is a warmer environment with a shorter replacement fire return interval.

Vegetation Classes

Class A 20 %

Early Development 1 Open

Upper Layer Lifeform

- ☐ Herbaceous
☒ Shrub
☐ Tree

Fuel Model

8

Description

Early succession after stand replacement fires. Herbaceous species dominate for the first 5-10yrs, followed by codominant shrubs and tree saplings. Tree regeneration is dominated by lodgepole pine, resulting in succession to class C. Occasionally, a lack of lodgepole seed source allows spruce and fir to dominate from the beginning, a condition portrayed in our model by alternate succession from class A to B (annual probability= 0.007). Succession to class C after about 30yrs. Replacement fire (MFRI=140) resets.

Indicator Species and Canopy Position

CHAN9
Upper
SASC
Upper
VAME
Upper
PICO
Upper

Structure Data (for upper layer lifeform)

	Min	Max
Cover	0 %	100 %
Height	Shrub 0m	Shrub 3.0m
Tree Size Class	Sapling >4.5ft; <5"DBH	

☐ Upper layer lifeform differs from dominant lifeform.

Class B 10 %

Mid Development 2 All Structures

Upper Layer Lifeform

- ☐ Herbaceous
☐ Shrub
☒ Tree

Fuel Model

10

Indicator Species and Canopy Position

ABLA
Upper
PIEN
Upper
PSME
Upper
ABGR

Structure Data (for upper layer lifeform)

	Min	Max
Cover	0 %	100 %
Height	Tree 5.1m	Tree 25m
Tree Size Class	Medium 5-15"DBH	

☐ Upper layer lifeform differs from dominant lifeform.

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Description

Upper

Stands composed of mid-sized spruce and fir, 5-15in DBH, with minor lodgepole pine, Douglas fir, grand fir and larch. Stand-replacement fires are not unusual but insect/disease outbreaks are rare. One pathway that lead to this class is from class A, when regeneration after stand-replacement fires lacks significant lodgepole pine. A second pathway is from class D, when spruce and fir become established under lodgepole pine and persist through bark beetle attacks on lodgepole and escape fire. Fires are somewhat less frequent than in lodgepole-dominated stands (classes C and D) because of higher ground fuel moisture contents. Stands are 30-100yrs old. Succession to class E. Replacement fire (MFRI=140) resets to class A.

Class C 40 %**Indicator Species and Canopy Position****Structure Data (for upper layer lifeform)**

Mid Development 1 All Structures

PICO

Upper

LIBO3

Lower

VAME

Lower

VASC

Lower

Upper Layer Lifeform☐ Herbaceous☐ Shrub☒ Tree**Fuel Model**

8

	Min	Max
Cover	0 %	100 %
Height	Tree 5.1m	Tree 10m
Tree Size Class	Pole 5-9" DBH	

☐ Upper layer lifeform differs from dominant lifeform.**Description**

Stands composed of pole-sized lodgepole pine (5-9in DBH; up to 25m tall), with minor amounts of other species, typically suppressed in the understory. Lodgepole pines are still small enough to be less susceptible to bark beetles. Stands are 30-80yrs old. Succession to D after about 50yrs. Replacement fire (MFRI=100yrs) resets to class A. Mixed fire (MFRI=200yrs) maintains in class C.

Class D 25 %**Indicator Species and Canopy Position****Structure Data (for upper layer lifeform)**

Late Development 1 All Structures

PICO

Upper

LIBO3

Lower

VAME

Lower

VASC

Lower

Upper Layer Lifeform☐ Herbaceous☐ Shrub☒ Tree**Fuel Model**

10

	Min	Max
Cover	0 %	100 %
Height	Tree 10.1m	Tree 25m
Tree Size Class	Medium 9-21"DBH	

☐ Upper layer lifeform differs from dominant lifeform.**Description**

Stands composed of medium-sized lodgepole pines (9-20in DBH), with subalpine fir and Englemann spruce typically present in the understory. The pines are highly susceptible to outbreaks of mountain pine beetles, which move a stand back to class C (annual probability = 0.013; about 75yrs on average). In the absence of fire and with the releasing effect of pine beetles thinning the lodgepole overstory, these stands will succeed to class B, but this transition was removed because it violated the LANDFIRE modeling rule that age must line up along the main successional pathway. Main successional pathway changed from D to B to D to D (see comments for the effects of this change). Stands between about 80 to 160yrs. Mixed fire (MFRI=500yrs) maintains in class D. Wind/weather/stress (annual prob. = 0.004) causes transition to class C.

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Class E 5 %

**Indicator Species and
Canopy Position**

Structure Data (for upper layer lifeform)

Late Development 2 All Structures

ABLA

Upper Layer Lifeform

☐ Herbaceous

☐ Shrub

☒ Tree

Fuel Model

10

PIEN

CLUN2

VAME

	Min	Max
Cover	0 %	100 %
Height	Tree 25.1m	Tree 50m
Tree Size Class	Very Large >33"DBH	

☐ Upper layer lifeform differs from dominant lifeform.

Description

Large subalpine fir and Englemann spruce (>15in DBH; 10-50m tall), with minor amounts of other conifers (PSME and ABGR). These stands are susceptible to spruce beetle, which cause transition to class B (annual prob. = 0.007), and susceptible to roots diseases (Phellinus and Armillaria), causing transitions to class C (annual prob. = 0.004). These stands are also susceptible to windthrow (annual prob. = 0.007), causing transition to class B. Fires are somewhat less frequent than in lodgepole-dominated stands (classes C and D) because of higher ground fuel moisture contents (MFRI=200yrs).

Disturbances

Fire Regime Group:** III

Historical Fire Size (acres)

Avg 1000

Min 100

Max 10000

Fire Intervals

	Avg FI	Min FI	Max FI	Probability	Percent of All Fires
Replacement	125			0.008	79
Mixed	465			0.00215	21
Surface					
All Fires	99			0.01016	

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.

Sources of Fire Regime Data

☒ Literature

☐ Local Data

☒ Expert Estimate

Additional Disturbances Modeled

☒ Insects/Disease ☐ Native Grazing ☐ Other (optional 1)

☒ Wind/Weather/Stress ☐ Competition ☐ Other (optional 2)

References

Agee, J.K. 1993. Fire ecology of Pacific Northwest forests. Washington, DC: Island Press. 493 pp.

Heyerdahl, E.K. and J.K. Agee. 1996. Historical fire regimes of four sites in the Blue Mountains, Oregon and Washington. Final Report, University of Washington, Seattle. 173 pp.

Johnson, C.G. Jr. 2004. Alpine and subalpine vegetation of the Wallowa, Seven Devils and Blue Mountains. R6-NR-ECOL-TP-03-04. Portland, OR: USDA Forest Service, Pacific Northwest Region, 612 pp.

Johnson, C.G. and R.R. Clausnitzer. 1992. Plant associations of the Blue and Ochoco Mountains. P6-ERW-TP-036-92. Portland, OR: USDA Forest Service, Pacific Northwest Region. 164 pp. + appendices.

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Johnson, C.G. and S.A. Simon. 1986. Plant associations of the Wallowa-Snake province. R6-ECOL-TP-255b-86. Portland, OR: USDA Forest Service, Pacific Northwest Region. 272 pp. + appendices.

NatureServe. 2007. International Ecological Classification Standard: Terrestrial Ecological Classifications. NatureServe Central Databases. Arlington, VA. Data current as of 10 February 2007.

Simpson, M.L. 1990. Subalpine fir- Beargrass Habitat Type: Succession and Management. MS Thesis University of Idaho. 96 pp.

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