10510
Southern Rocky Mountain Dry-Mesic Montane Mixed Conifer Forest and Woodland

BpS Model/Description Version: Aug. 202003/02/05

Modelers		Reviewers	
Mark Loewen	mloewen@fs.fed.us	Tim Christiansen, Dan Binkley	tchristiansen@tnc.org, dan.binkley@colostate.edu
Doug Page	doug_page@blm.gov	Rory Steinke	rsteinke@fs.fed.us
Linda Chappell	lchappell@fs.fed.us	Linda Wadleigh	lwadleigh@fs.fed.us

Vegetation Type
Forest and Woodland

Map Zones
15, 16, 17, 22, 23, 24, 25

Geographic Range
Occurs throughout the southern Rockies, north and west into Utah, Nevada, western Wyoming, and Idaho.

Biophysical Site Description
This type is generally located just above sagebrush ecosystems and adjacent to ponderosa pine woodlands. These are mixed-conifer forests occurring on all aspects at elevations ranging from 1,200-3,300m. Rainfall averages <75cm per year (40-60cm) with summer "monsoons" during the growing season contributing substantial moisture. The composition and structure of overstory is dependent upon the temperature and moisture relationships of the site and the succession status of the occurrence.

Vegetation Description
Pseudotsuga menziesii and *Abies concolor* are most frequent, but *Pinus ponderosa* may be present to co-dominant. *Pinus flexilis* is common in Nevada. *Pseudotsuga menziesii* forests occupy drier sites, and *Pinus ponderosa* is a common co-dominant. *Abies concolor*-dominated forests occupy cooler sites, such as upper slopes at higher elevations, canyon side slopes, ridge tops, and north- and east-facing slopes, which burn somewhat infrequently. *Picea pungens* is most often found in cool, moist locations, often occurring as smaller patches within a matrix of other associations. As many as seven conifers can be found growing in the same occurrence, and there are a number of cold-deciduous shrub and graminoid species common, including *Arctostaphylos uva-ursi*, *Mahonia repens*, *Paxistima myrsinites*, *Symphoricarpos oreophilus*, *Jamesia americana*, *Quercus gambelii*, and *Festuca arizonica*.

BpS Dominant and Indicator Species

Symbol	Scientific Name	Common Name
PSEUD7	*Pseudotsuga*	Douglas-fir
ABCO	*Abies concolor*	White fir
PIPO	*Pinus ponderosa*	Ponderosa pine

PICO	*Pinus contorta*	Lodgepole pine
CARU	*Calamagrostis rubescens*	Pinegrass
CAGA3	*Carex garberi*	Elk sedge

Species names are from the NRCS PLANTS database. Check species codes at http://plants.usda.gov.

Disturbance Description

Areas dominated by Douglas-fir have a fire regime dominated by frequent low- and mixed-severity fires. Some portions of these sites are transition zones to fire regimes that are characterized by high-frequency, high-severity fires or moderate-frequency, low- and mixed-severity fires. Frequent surface and mixed-severity fires were the common fire regime characteristics. Surface fire intervals ranged from 10-50yrs, and replacement severity occurred at intervals of 150-400yrs+ (Crane 1986; Barrett 1988; Bradley 1992a and 1992b; Brown 1994; Morgan et al. 1996). Mixed-severity fires were assumed to have an intermediate fire return interval of 45-75yrs on average. Stand-replacement fires were generally restricted to the closed canopy forest and the stand initiation conditions.

The high-frequency, low- and mixed-severity fire regime characteristics are facilitated by understory vegetation dominated by fine fuel (grasses, sedges, and forbs), landscape position, and adjacency to other frequent fire Biophysical Settings (BpSs). Much of the forest structure was open canopy overstory that resulted in an understory dominated by healthy and vigorous plants (grasses, sedges, and forbs) and generally continuous fine fuel layer. This fine fuel facilitated fire spread and thinning of the conifer or aspen seedlings (thus promoting aspen suckering).

Other disturbances included insects and disease and drought, wind, and ice damage. Competition among trees was also a factor that increasingly slowed succession dynamics in more closed stands. Fire was by far the dominant disturbance agent.

Fire Frequency

Severity	Avg FI	Percent of All Fires	Min FI	Max FI
Replacement	89	12		
Moderate (Mixed)	76	14		
Low (Surface)	14	74	10	50
All Fires	11	100		

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. Percent of all fires is the percent of all fires modeled in that severity class. Minimum and Maximum FIs show the relative range of fire intervals as estimated by model contributors, if known.

Scale Description

This BpS occurs in patches ranging from 1,000s-10,000s of acres.

Adjacency or Identification Concerns

Aspen patches occurred at smaller scales than in more mesic mixed-conifer forests. These more mesic sites would have had grass understories that did not cure as early in the year as surrounding areas, especially under a closed forest canopy, and these mesic areas often experience quicker humidity recovery in the evenings. These circumstances tended to lessen the fire severity in the aspen stands, which acted as fire-safe sites compared to the surrounding landscape. This was important because aspen is much less resistant to fire than Douglas-fir. Greater suckering would occur at the edges of aspen patches.

If aspen is present in large patches or if conifers are not coming in after ~30yrs, the BpS is probably misclassified, and one of the pure aspen types should be examined (Rocky Mountain Aspen Forest and Woodland [1011] or Intermountain Basins Aspen-Mixed Conifer Forest and Woodland [1061]).

BpS is often transitional between non-forested areas or between *Pinus ponderosa* (at lower elevations) and spruce-fir at higher elevations. It may, thus, grade into Southern Rocky Mountain Ponderosa Pine Woodland (1054) at lower elevations and Rocky Mountain Subalpine Dry-Mesic Spruce-Fir Forest and Woodland (1055).

Issues or Problems

Native Uncharacteristic Conditions

Comments

Succession Classes

Mapping Rules

Upper Layer Lifeform	Height (m)	Canopy Cover (%)									
		0-10	11-20	21-30	31-40	41 - 50	51-60	61-70	71-80	81-90	91-100
Herb	0-0.5	A	A	A	A	A	A	A	A	A	A
Herb	0.5-1.0	A	A	A	A	A	A	A	A	A	A
Herb	>1.0	A	A	A	A	A	A	A	A	A	A
Shrub	0-0.5	A	A	A	A	A	A	A	A	A	A
Shrub	0.5-1.0	A	A	A	A	A	A	A	A	A	A
Shrub	1.0-3.0	A	A	A	A	A	A	A	A	A	A
Shrub	>3.0	A	A	A	A	A	A	A	A	A	A
Tree	0-5	A	A	A	A	A	A	A	A	A	A
Tree	5-10	C	C	C	C	B	B	B	B	B	B
Tree	10-25	D	D	D	D	E	E	E	E	E	E
Tree	25-50	D	D	D	D	E	E	E	E	E	E
Tree	>50	D	D	D	D	E	E	E	E	E	E

Succession class letters A-E are described in the Succession Class Description section. Some classes use a leafform distinction where a qualifier is added to the class letter: Brdl (broadleaf), Con (conifer), or Mix (mixed conifer and broadleaf). UN refers to uncharacteristic native or a combination of height and cover that would not be expected under the reference condition. NP refers to not possible or a combination of height and cover which is not physiologically possible for the species in the BpS.

Description

Class A 22 Early Development 1 - All Structures

Indicator Species

Symbol	Scientific Name	Common Name	Canopy Position

CARU	Calamagrostis rubescens	Pinegrass	Low-Mid
CAGA3	Carex garberi	Elk sedge	Low-Mid
PSEUD7	Pseudotsuga	Douglas-fir	Upper
PIPO	Pinus ponderosa	Ponderosa pine	Upper

Description
Grass/forb/shrub/tree seedlings.

Maximum Tree Size Class
Sapling >4.5ft; <5" DBH

Class B 7 Mid Development 1 - Closed

Indicator Species

Symbol	Scientific Name	Common Name	Canopy Position
PSEUD7	Pseudotsuga	Douglas-fir	Upper
ABCO	Abies concolor	White fir	Upper
PIPO	Pinus ponderosa	Ponderosa pine	Upper
PICO	Pinus contorta	Lodgepole pine	Upper

Description
Closed stand with trees, poles, saplings, grass, and scattered shrub, 75-100% Douglas-fir and/or white fir.
Maximum Tree Size Class
Pole 5-9" DBH

Class C 12 Mid Development 1 - Open

Indicator Species

Symbol	Scientific Name	Common Name	Canopy Position
PSEUD7	Pseudotsuga	Douglas-fir	Upper
PIPO	Pinus ponderosa	Ponderosa pine	Upper

Description
Open trees (poles and saplings) of Douglas-fir and occasional ponderosa pine with grass and scattered shrubs.

Maximum Tree Size Class
Pole 5-9" DBH

Class D 58 Late Development 1 - Open

Indicator Species

Symbol	Scientific Name	Common Name	Canopy Position

PSEUD7	Pseudotsuga	Douglas-fir	Upper
PIPO	Pinus ponderosa	Ponderosa pine	Upper

Description
Open large tree/grass and scattered shrubs; Douglas-fir with occasional ponderosa pine.
Maximum Tree Size Class
Large 21-33" DBH

Class E 1 Late Development 1 - Closed

Indicator Species

Symbol	Scientific Name	Common Name	Canopy Position
PSEUD7	Pseudotsuga	Douglas-fir	Upper
ABCO	Abies concolor	White fir	Upper
PICO	Pinus contorta	Lodgepole pine	Upper
PIPO	Pinus ponderosa	Ponderosa pine	Middle

Description
Closed large trees of Douglas-fir, white fir, and occasional lodgepole pine and scattered shrubs.

Maximum Tree Size Class
Large 21-33" DBH

Model Parameters

Deterministic Transitions

From Class	Begins at (yr)	Succeeds to	After (years)
Early1:ALL	0	Mid1:CLS	34
Mid1:OPN	35	Late1:OPN	104
Mid1:CLS	35	Late1:CLS	104
Late1:OPN	105	Late1:OPN	999
Late1:CLS	105	Late1:CLS	999

Probabilistic Transitions

Disturbance Type	Disturbance occurs In	Moves vegetation to	Disturbance Probability	Return Interval (yrs)	Reset Age to New Class Start Age After Disturbance?	Years Since Last Disturbance
Mixed Fire	Early1:ALL	Early1:ALL	0.01	100	No	0
Replacement Fire	Early1:ALL	Early1:ALL	0.04	25	Yes	0
Alternative Succession	Mid1:OPN	Late1:CLS	1	1	Yes	68
Wind or Weather or Stress	Mid1:OPN	Early1:ALL	0.001	1000	Yes	0
Replacement Fire	Mid1:OPN	Early1:ALL	0.0025	400	Yes	0

Competition or Maintenance	Mid1:OPN	Mid1:OPN	0.005	200	No	0
Insects or Disease	Mid1:OPN	Mid1:OPN	0.01	100	No	0
Mixed Fire	Mid1:OPN	Mid1:OPN	0.013	77	No	0
Surface Fire	Mid1:OPN	Mid1:OPN	0.1	10	No	0
Wind or Weather or Stress	Mid1:CLS	Early1:ALL	0.004	250	Yes	0
Replacement Fire	Mid1:CLS	Early1:ALL	0.007	143	Yes	0
Insects or Disease	Mid1:CLS	Mid1:OPN	0.01	100	Yes	0
Competition or Maintenance	Mid1:CLS	Mid1:CLS	0.01	100	No	0
Mixed Fire	Mid1:CLS	Mid1:OPN	0.0222	45	Yes	0
Alternative Succession	Late1:OPN	Late1:CLS	1	1	Yes	70
Competition or Maintenance	Late1:OPN	Late1:OPN	0.001	1000	No	0
Wind or Weather or Stress	Late1:OPN	Early1:ALL	0.001	1000	Yes	0
Replacement Fire	Late1:OPN	Early1:ALL	0.002	500	Yes	0
Insects or Disease	Late1:OPN	Late1:OPN	0.01	100	No	0
Mixed Fire	Late1:OPN	Late1:OPN	0.013	77	No	0
Surface Fire	Late1:OPN	Late1:OPN	0.1	10	No	0
Wind or Weather or Stress	Late1:CLS	Early1:ALL	0.004	250	Yes	0
Replacement Fire	Late1:CLS	Early1:ALL	0.007	143	Yes	0
Insects or Disease	Late1:CLS	Late1:OPN	0.01	100	Yes	0
Competition or Maintenance	Late1:CLS	Late1:CLS	0.01	100	No	0
Surface Fire	Late1:CLS	Late1:CLS	0.02	50	No	0
Mixed Fire	Late1:CLS	Late1:OPN	0.0222	45	Yes	0

References

Barrett, S.W. 1988. Fire Suppression effects on Forest Succession within a Central Idaho Wilderness. Western J. of Applied Forestry. 3(3): 76-80.

Barrett, S.W. 1994. Fire Regimes on the Caribou National Forest, Southern Idaho. Final Report – Contract No. 53-02S2-3-05071. September 1994.

Barrett, S.W. 2004. Altered fire intervals and fire cycles in the northern Rockies. Fire Management Today 64(2): 25-29.

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

Bradley, A.F., W.C. Fische and N.V. Noste. 1992a. Fire Ecology of the Forest Habitat Types of Eastern Idaho and Western Wyoming. Intermountain Research Station, Ogden UT 84401. GTR-INT-290.

Bradley, A.F., N.V. Noste and W.C. Fischer. 1992b. Fire Ecology of the Forests and Woodland in Utah. Intermountain Research Station, Ogden UT 84401. GTR-INT-287.

Brown, J.K., S.F. Arno, S.W. Barrett and J.P. Menakis. 1994. Comparing the Prescribed Natural Fire Program with Presettlement Fires in the Selway-Bitterroot Wilderness. Int. J. Wildland Fire 4(3): 157-168.

Crane, M.F. and W.C. Fisher. 1986. Fire Ecology of the forested habitat types of central Idaho. USDA Forest Service, General Technical Report INT-218. 86 pp.

Mason, R.R., D.W. Scott, M.D. Loewen and H.D. Paul. 1998. Recurrent outbreak of the Douglas-fir tussock moth in the Malheur National Forest: a case history. USDS Forest Service. Pacific Northwest Research Station. General Technical Report PNW-GTR-402. 14 pp.

Morgan, P., S.C. Bunting, A.E. Black, T. Merrill and S. Barrett. 1996. Fire Regimes in the Interior Columbia River Basin: Past and Present. Final Report For RJVA-INT-94913: Course-scale classification and mapping of disturbance regimes in the Columbia River Basin. Submitted to: Intermountain Fire Science Lab., Intermountain Research Station, Missoula, Montana, USDA Forest Service.

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

Steele, R., R.D. Pfister, R.A. Ryker and J.A. Kittams. 1981. Forest Habitat Types of Central Idaho. USDA Forest Service Tech. Rep. INT-114. Intermountain Forest and Range Experiment Station, Ogden, Utah 84401. 138 pp.

Swetnam, T.W., B.E. Wickman, H.G. Paul and C.H. Baisan. 1995. Historical patterns of western spruce budworm and Douglas-fir tussock moth outbreaks in the northern Blue Mountains, Oregon, since A.D. 1700. USDA Forest Service. Pacific Northwest Research Station, Research Paper PNW-RP-484. 27 pp.