10590
Southern Rocky Mountain Pinyon-Juniper Woodland

BpS Model/Description Version: Aug. 2020

Modelers		Reviewers	
Rex Pieper	rpieper@nmsu.edu	Dave Borland	david_borland@nm.blm.gov
Noe Gonzalez	noe_gonzalez@blm.gov	Ed Biery (rvwd concepts)	ehbiery@fs.fed.us
John Tunberg	john.tunberg@nm.usda.gov	Peter Brown (rvwd concepts)	pmb@rmtrr.org

Vegetation Type
Forest and Woodland

Map Zones
27, 33

Geographic Range
Southern Rocky Mountain ecological system occurs on semiarid mountains and foothills in southern Colorado east of the Continental Divide; in foothills, mountains, and plateaus of New Mexico; and extends east to limestone breaks in the southeastern Great Plains. In New Mexico, stands occur in the foothills of Sacramento, Oscura, San Andres, Sierra Ladrone, Manzano, and Sandia mountains (steep slopes of Chupadera Mesa).

In map zone (MZ) 27 in New Mexico, it probably doesn't occur in ECOMAP subsections 315Ba and 315Fb, but it could occur everywhere else, scattered throughout the foothills, mountains, and plateaus. It shouldn't extend very far out on the plains, except on breaks. Probably a minor component of subsection 315Bd. Along subsections 313Bd and 331Bd, would be on finger ridges on the western edges. It occurs along the western edge of MZ27.

It would occur in ECOMAP subsections 331 and 315 in between New Mexico and Colorado state lines.

Biophysical Site Description
This southern Rocky Mountain ecological system occurs on dry mountains and foothills in southern Colorado east of the Continental Divide, in mountains and plateaus of north-central New Mexico, and extends out onto limestone breaks in the southeastern Great Plains. These woodlands occur on warm, dry sites on mountain slopes, mesas, plateaus, and ridges. Severe climatic events occurring during the growing season, such as frosts and drought, are thought to limit the distribution of pinyon-juniper woodlands to relatively narrow altitudinal belts on mountainsides. Soils supporting this system vary in texture, ranging from stony, cobbly, and gravelly sandy loams to clay loam or clay (NatureServe 2006).

This biophysical system typically is found at elevations between 1,800m and 2,400m. These light to moderately dense woodlands occur at more mesic and often steeper and rockier sites and

ridges compared to pinyon-juniper savannas. More heavily dense areas would occur in pockets on northerly aspects.

Severe climatic events such as frost and drought, and aspect are thought to determine the distribution.

Generally, pinyon-juniper woodlands occur on mountain toe-slopes, mesas, and piedmont slopes.

Soils supporting this system vary in texture from stony, cobbly, gravelly soils ranging from moderately fine to fine texture.

There can be latitudinal variation for pinyon-juniper occurrence. For instance, in the southern area of MZ27, pinyon-juniper occur at the higher elevational range.

Precipitation ranges from approximately 15-18in annually. Majority of growing season precipitation is in the summer.

The soils in the pinyon-juniper woodland and pinyon-juniper woodland/savanna type drive the fire regime, and so these types should be mapped by soil, aspect, and elevation.

Canopy and understory characteristics vary considerably from place to place, from sparse stands of scattered small trees growing on poor substrates to relatively dense stands of large trees on productive sites.

Closed canopy pinyon-oneseed juniper stands appear common in limestone soils, with surface bedrock or high amounts of stony surface. Similar occurrences have been in the Lincoln National Forest (Sacramento District, along Westside road) as well as the Apache National Forest (north of Clifton, Arizona). The Apache National Forest site was limestone also and had a mix of Nolina, mahogany, and other shrubs, and occasional Arizona cypress mixed in, but definitely closed canopy. Rhyolitic soils may also support same kind of stands; not much underneath, but closed canopy. The sandstone- and basalt-derived soils appear more open; closed canopy is another anomaly (Noe Gonzalez, BLM, pers. comm.).

Vegetation Description

Pinus edulis (twoneedle pinyon) and/or *Juniperus monosperma* (oneseed juniper) dominate the tree canopy. Rocky Mountain juniper would be in north end of MZ27 and at higher elevation sites, whereas oneseed juniper would be common in the central and southern end, with incidental occurrences of alligator juniper (in the southern end). Twoneedle pinyon increases in abundance as elevation increases in the north, and juniper decreases and is an indicator species for this biophysical setting (BpS).

Understory layers are variable and may be dominated by shrubs or graminoids. Associated species in the north of MZ27 New Mexico are Gambel oak, true mountain mahogany, western wheatgrass, Arizona fescue, and blue grama (warm-season component). Associated species in the south of MZ27 in New Mexico are New Mexico muhly, pinyon ricegrass, blue grama, and mahonia (algerita). Could also have needle-and-thread grass (more in the north), New Mexico feathergrass, and little bluestem (in north and south end of MZ27 in New Mexico).

BpS Dominant and Indicator Species

Symbol	Scientific Name	Common Name
JUMO	*Juniperus monosperma*	Oneseed juniper
JUSC2	*Juniperus scopulorum*	Rocky Mountain juniper
PIED	*Pinus edulis*	Twoneedle pinyon
BOGR2	*Bouteloua gracilis*	Blue grama
PASM	*Pascopyrum smithii*	Western wheatgrass
HECO26	*Hesperostipa comata*	Needle-and-thread
CEMO2	*Cercocarpus montanus*	Alderleaf mountain mahogany
QUGA	*Quercus gambelii*	Gambel oak

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

Disturbance Description

In persistent pinyon-juniper woodlands, fire regimes were mostly of the infrequent, stand-replacing type. There were also many situations in which fire was rare and disturbance regimes were dominated by periodic drought or insect-caused mortality instead of fire (Romme Working Group 2006). In these cases, fire played a small role relative to climate fluctuations (droughts and pluvials) and other disturbances (e.g., the recent ips outbreak). These types are distinguished by poor surface fuels and generally widely scattered overstories, and are found throughout the Southwest.

Original MZ27 modelers (Pieper, Gonzalez, Tunberg, et al.) stated that the fire regime of this ecological system included mixed low-severity fires every 15-50yrs and stand replacement every 150-250yrs; however, they stated that that was based on speculation and to get the expert opinions of others. It is thought that in the north of MZ27 in New Mexico, fire return intervals (FRIs) for low-severity fires would be more frequent than in the south end of New Mexico MZ27. And where 1059 occurs adjacent to the prairie and woodland transition, likelihood of fires burning into the ppinyon-juniper from grasslands is highly probable. Again, need to look at soils and aspect as well (Noe Gonzalez, BLM, pers. comm.). However, after review, it was decided by information, literature, and reviews gathered by Regional Lead, and comparisons to adjacent MZs, that another viewpoint of rare replacement fire regime would be adopted, instead. The low-severity regime would be adopted for BpS 1119 pinyon-juniper Savanna. It is thought that there should be approximately 50-60% replacement fire, 20-25% mixed-severity fire, and 20-30% low-severity fire (Borland, pers. comm.) in the pinyon-juniper woodland type. This takes into consideration all viewpoints of mostly replacement fire, but infrequent, and also some portion of low-severity fire. Note that it was also decided that low-severity fire, if in rocky areas, could not have a return interval/rotation of such a short length because it would take a long time for fire to be able to spread through the entire area due to its rocky nature.

Other adjacent MZs and Rapid Assessment (RA) models of pinyon-juniper woodlands also followed the line of thinking described by MZ27 reviewers: infrequent replacement fire; very little (if any) low-severity fire. All other pinyon-juniper woodland models fell into fire regime group (FRG) III. The model for MZ27 was therefore changed to be more consistent with the majority line of thinking, in terms of mean FRIs (MFRIs), but all discussion was documented.

Original MZ27 model had the following MFRIs: replacement fire - 450 yrs, mixed fire - 1000 yrs, surface/low fire - 35 yrs, and all fire - 31 yrs.

Model was changed to be more in line with Rapid Assessment PINYON-JUNIPER woodland models and all reviewer comments with the following MFRIs: replacement fire - 300 yrs, mixed fire - 400 yrs, surface/low fire - 555 yrs, and all fire – 131 yrs.

Note that these changes in MFRIs only slightly changed the class percentages on the landscape, as Regional Lead tried to maintain the integrity of the original model and line of thinking in terms of the composition on the landscape. The original sclass percents in classes A-D respectively were: 10, 10, 50, 30. The adapted sclass percents in classes A-D respectively were: 10, 20, 45, 25

Spreading, low-intensity surface fires had a very limited role in molding stand structure and dynamics of persistent pinon-juniper woodlands in the historical landscape (Ed Biery, USFS; Dave Borland, BLM; others; pers. comm.). Instead, the dominant fire effect was to kill most or all trees and to top-kill most or all shrubs. This statement is also true of most fires today (Romme working group, 2006). Historical fires in persistent pinyon-juniper woodlands did not thin from below. Instead, they tended to kill all or most of the trees within the places that burned regardless of tree size. This statement is also true today (Romme working group, 2006).

Historical fire rotations varied from place to place in persistent pinyon-juniper woodlands, but generally were very long - i.e.: centuries (Romme working group, 2006).

This variability in estimated fire frequency is common for pinyon-juniper woodlands and is controversial. For example, monsoon-season lightning (June-September) is one of the ignition sources and most often causes fires in adjacent lower (pinyon-juniper) or upper (ponderosa) elevation savannas with fine fuels that can carry upslope to this BpS.

Ignitions by Native Americans via intentional or accidental means was a source of fire in this BpS. This could have occurred in all seasons. (However, due to the rocky nature of this woodland, it is thought that ignitions would more likely have occurred in BpS 1119.)

Soil texture drives the fire regime. Sites with higher potential for graminoid understory have higher fine fuel loading and create the spread component for more frequent and lower fire intensity. Sites with gravelly soils produce less grass and more shrub components, have less fire frequency, which is more lethal when fire is a wind-driven event (Dave Borland, BLM, pers. comm.). However, soil texture, surface rock content, and/or parent material might drive the fire regime. In New Mexico and Arizona, closed-canopy pinyon-oneseed juniper stands appear common in limestone soils, with surface bedrock or high amounts of stony surface, closed canopy, not much surface fine fuels, and fire usually was catastrophic in nature, not low intensity. Rhyolitic soils may also support the same kind of stands; not much underneath, but closed canopy and likely catastrophic fire nature. The sandstone- and basalt-derived soils appear more open; closed canopy is another anomaly. In addition, low-intensity burns appear more common, as evidenced by fire-scarred trees (Noe Gonzalez, BLM, pers. comm.).

Drought, dwarf mistletoe or other disease, and insect (bark beetle) outbreaks influence community structure. Such disturbances cause rapid decline in pinyon pine.

Also, there is climate change and pluvials. In some persistent woodlands, stand dynamics are driven more by climatic fluctuation, insects, and disease than by fire (Romme working group, 2006).

Pinyon-juniper establishment outside of the historical range of variability was episodic during high-precipitation periods.

Tree-cutting by Native Americans also influenced plant community structure.

Herbivory (bison) would have just been incidental occurrences historically. Elk and deer browsing would have occurred, depending on water source availability.

Fire Frequency

Severity	Avg FI	Percent of All Fires	Min FI	Max FI
Replacement	325	42	20	1000
Moderate (Mixed)	405	34	20	1000
Low (Surface)	563	24		
All Fires	137	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

Pinyon-juniper woodland usually was distributed across the landscape in patches between hundreds of acres and thousands of acres. In particularly dissected topography, this type may have occurred in smaller patches. This also can occur in stringers off of major mountain ranges such as the Manzanos, Sangre de Cristos, and Sandia mountains. It can also occur as stringers along canyon side-slopes, escarpment breaks.

Adjacency or Identification Concerns

Pinyon-juniper savanna, chaparral/montane shrubland (e.g., mountain mahogany-scrub oak), and ponderosa woodlands are adjacent vegetation types. In the upper elevation, grades into ponderosa pine; in the lower elevations, grades into shrubs then grass types.

This system may be confused with invaded juniper or shrub savanna. This BpS is probably more common today than it was historically.

For mapping, please note that invasive woodlands can look like persistent woodlands. Mappers need to use topography, soils, etc., to distinguish (persistent woodlands also can have highly degraded understory and soils) (Steven Yanoff, TNC, pers. comm.). This system might be difficult to distinguish from BpS 1119 in areas where there has been infilling or a type conversion. Former pinyon-juniper savannas (BpS 1190) or grasslands can become tree invaded, encroached, converted and appear like BpS 1059, so soils are needed to distinguish them.

We need to distinguish between (BpS 1059) persistent woodlands where trees were dominant versus areas where woody plants are either increasing in density relative to shrub- or grass-dominated systems (infilling), or expanding into previously unwooded areas (expansion).

In places with BpS 1059 and a rare or no fire replacement regime, where fire played a small role relative to climate fluctuations (droughts and pluvials) and other disturbances (e.g., the recent ips outbreak), these types are distinguished by poor surface fuels and generally widely scattered overstories, and are found throughout the Southwest.

In the southern part of MZ27 New Mexico, tendency to maintain juniper savannas as a result of grazing influences and altered fire cycles. In disturbed conditions, plant communities become more xeric, then juniper dominates and would appear more like juniper savanna.

Tree density and canopy coverage have increased in many or most persistent pinyon-juniper woodlands during the 20th century. This is not due primarily to fire exclusion or land use change, but is the normal dynamic of these ecosystems. This natural process also has been enhanced by favorable climatic conditions for tree growth during most of the 20th century (Romme working group, 2006).

An important result of expansion into formerly non-wooded areas in many regions is that formerly heterogeneous mosaics of small patches of woodland, shrubland, and grassland are becoming more homogeneous as trees become established in the shrubland and grassland patches (Romme working group, 2006).

There is also a concern about surface erosion around juniper in degraded areas currently. Degraded areas are prone to accelerated erosion. This leads to overabundance of tree canopy. There is incidental grazing occurring in this system.

Expansion of rabbitbrush into this system on finer soils currently.

Canopy and understory characteristics vary considerably from place to place, from sparse stands of scattered, small trees growing on poor substrates to relatively dense stands of large trees on productive sites. Tree density and canopy cover also may fluctuate in response to disturbance and climatic variability. Nevertheless, these are plant communities in which pinyon and/or juniper are dominant species, both historically and currently, unless recently disturbed by fire, clearing, or other severe disturbance (Romme working group, 2006).

Grazing history also has a lot to do with altered stand structures. The Lincoln National Forest, before it became a national forest, had heavy grazing on it because much of it was private lands and unregulated public domain. Per historical accounts, there were 20,000+ animals (exceeds current permitted numbers) removed from the forest as so-called “strays” after the initial removal took place in the early part of the 20th century (the Lincoln National Forest was mostly acquired lands, not designated Forest Reserves) (Noe Gonzalez, BLM, pers. comm.).

Issues or Problems

Fire regimes are varied and not well known across the large landscape. Fire scars are difficult to read in pinyon-juniper. Fire scars are more often found on junipers. Information about fire

regimes is extrapolated from adjacent systems, and extreme caution is warranted when interpreting these models. Fire season can be inferred more reliably than fire frequency; the former likely is equally or more important than the latter.

The historical extent to adjacent savanna is not clear. The interrelationship of drought, insect damage, and fire regimes singly or in combination are not known.

Note that canopy cover was originally modeled in MZ27 as lower than the typical BpS 1059 persistent pinyon-juniper model. However, canopy and understory characteristics vary considerably from place to place, from sparse stands of scattered, small trees growing on poor substrates to relatively dense stands of large trees on productive sites. Tree density and canopy cover also may fluctuate in response to disturbance and climatic variability (Romme working group, 2006). Large expanses of the Colorado Plateau are characterized by ancient, sparse-density, persistent woodlands within spectacular rocky landscapes.

Native Uncharacteristic Conditions

Canopy coverage >50% is uncharacteristic in some areas. Sparse understory as a result of increased canopy closure is characteristic in some places. However, this system is variable throughout the MZ, and cover up to 70% should be allowed in some areas.

For mapping, please note that invasive woodlands can look like persistent woodlands. Mappers need to use topography, soils, etc., to distinguish. (Persistent woodlands also can have highly degraded understory and soils.)

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	UN	UN	UN
Herb	0.5-1.0	A	A	A	A	A	A	A	UN	UN	UN
Herb	>1.0	A	A	A	A	A	A	A	UN	UN	UN
Shrub	0-0.5	A	A	B	B	B	B	B	UN	UN	UN
Shrub	0.5-1.0	B	B	B	B	B	B	B	UN	UN	UN
Shrub	1.0-3.0	B	B	B	B	B	B	B	UN	UN	UN
Shrub	>3.0	B	B	B	B	B	B	B	UN	UN	UN
Tree	0-5	B	B	B	B	C	C	C	UN	UN	UN
Tree	5-10	C	C	C	C	C	C	C	UN	UN	UN
Tree	10-25	D	D	D	D	D	D	D	UN	UN	UN
Tree	25-50	D	D	D	D	D	D	D	UN	UN	UN
Tree	>50	D	D	D	D	D	D	D	UN	UN	UN

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 12 Early Development 1 - Open

Upper Layer Lifeform: Shrub

Indicator Species

Symbol	Scientific Name	Common Name	Canopy Position
QUGA	Quercus gambelii	Gambel oak	Middle
CEMO2	Cercocarpus montanus	Alderleaf mountain mahogany	Middle
BOGR2	Bouteloua gracilis	Blue grama	Lower
SCSC	Schizachyrium scoparium	Little bluestem	Lower

Description

There would be very little of this class historically.

Initial post-fire community grass and shrub dominated, consisting of mountain mahogany with Gambel oak sprouts, blue grama, little bluestem, western wheatgrass, stipas, and various forbs. Pinyon and juniper seedlings and saplings will be in low density. Grasses: min, 0%; max, 20%. Shrub cover max would probably be 15%. Tree cover would be <10%.

Evidence of past fires may be observed, including charcoal and resprouting woody plants. Trees exert very little influence until later age classes.

Replacement fire occurs every few centuries.

Currently Russian thistle, an exotic, is a major post-disturbance component, but depends on post-fire climatic conditions. Another increaser is snakeweed post-fire, given right moisture regime.

Original modelers stated that there could be grass-replacement fires, but they don't set succession back to zero; it keeps progressing. Replacement fire could kill juniper seedlings.

Drought maintains the class but doesn't set it back to the beginning.

Class B 22 Mid Development 1 - Open

Upper Layer Lifeform: Tree

Indicator Species

Symbol	Scientific Name	Common Name	Canopy Position
JUSC2	Juniperus scopulorum	Rocky Mountain juniper	Upper
JUMO	Juniperus monosperma	Oneseed juniper	Upper
CEMO2	Cercocarpus montanus	Alderleaf mountain mahogany	Middle

MAHE	Malacothamnus helleri	Heller's bush mallow	Middle

Description
Young juniper saplings are increasing and growing. Grass and shrubs are still dominant. Grass species that would be present are blue grama, little bluestem, western wheatgrass, and stipas. Pinyon seedlings delayed until shade occurs for better growth.

Original MZ27 modelers felt that this stage could be maintained for a long period with frequent, low-severity fires, as well as erratic moisture and burning by Native Americans. Surface/low-severity fire occurs in this class because there is still juniper canopy cover that is perhaps not all top-killed.

Mixed-severity fire also occurs because sometimes grass density is sufficient to result in pinyon and juniper scorch as well as mortality. Replacement fire occurs infrequently.

A heavy moisture cycle increases seedling production, and juveniles mature. Drought occurs but does not cause a transition.

Class C 44 Mid Development 1 - Closed
Upper Layer Lifeform: Tree

Indicator Species

Symbol	Scientific Name	Common Name	Canopy Position
JUMO	Juniperus monosperma	Oneseed juniper	Upper
PIED	Pinus edulis	Twoneedle pinyon	Upper
JUSC2	Juniperus scopulorum	Rocky Mountain juniper	Upper
QUGA	Quercus gambelii	Gambel oak	Upper

Description
Junipers reaching pole size, and pinyon pine seedlings and saplings are growing dependent on rainfall patterns and shade. Pinyon having rapid growth in this stage. Gambel oak is also forming stand patches. Thinning effect for mountain mahogany due to space/nutrient competition. Very little recruitment of junipers in this stage.

The closed-canopy pinyon-juniper stands are more scattered or localized based on soil or geologic circumstances. There could also be an elevation or moisture gradient that influences closed-canopy conditions (Gonzalez, pers. comm.). Closed-canopy pinyon-oneseed juniper stands appear common in limestone soils, with surface bedrock or high amounts of stony surface. Similar occurrences have been in the Lincoln National Forest (Sacramento District, along Westside road) as well as Apache National Forest (north of Clifton, Arizona). The Apache National Forest site was limestone and also had a mix of *Nolina*, mahogany, and other shrubs, and occasional Arizona cypress mixed in, but definitely closed canopy. Rhyolitic soils may also support same kind of stands; not much underneath, but closed canopy. The sandstone- and basalt-derived soils appear more open; closed canopy is another anomaly.

Class D 22 Late Development 1 - Closed
Upper Layer Lifeform: Tree

Indicator Species

Symbol	Scientific Name	Common Name	Canopy Position
PIED	Pinus edulis	Twoneedle pinyon	Upper
JUMO	Juniperus monosperma	Oneseed juniper	Upper
JUSC2	Juniperus scopulorum	Rocky Mountain juniper	Upper
QUGA	Quercus gambelii	Gambel oak	Upper

Description
Mature juniper mixed with maturing pinyon. Understory declining due to canopy closing. Small amount of fine fuels. Original modelers stated that, historically, would still be having cyclic understory surface fires (surface fire occurs every 30yrs, maintaining this stage), and herbaceous component still continuous, though not as dense as previous classes. However, all reviewers for MZ27 disagreed with this concept and felt it was more common in 1119; therefore, low-severity fire was modeled infrequently.

There is a shift in dominance from juniper to pinyon.

Pinyon would be susceptible to drought mortality, disease, insects.

In the tree-size class field, DBH is defined by diameter at root collar for multi-stem species (JUMO).

Mistletoe might also be influenced by drought, but not modeled due to lack of information.

The closed-canopy pinyon-juniper stands are more scattered or localized based on soil or geologic circumstances. There could also be an elevation or moisture gradient that influences closed-canopy conditions (Gonzalez, pers. comm.). Closed-canopy pinyon-oneseed juniper stands appear common in limestone soils, with surface bedrock or high amounts of stony surface. Similar occurrences have been in the Lincoln National Forest (Sacramento District, along Westside road) as well as Apache National Forest (north of Clifton, Arizona). The Apache National Forest site was limestone and also had a mix of *Nolina*, mahogany, and other shrubs, and occasional Arizona cypress mixed in, but definitely closed canopy. Rhyolitic soils may also support same kind of stands; not much underneath, but closed canopy. The sandstone- and basalt-derived soils appear more open; a closed canopy is another anomaly.

Model Parameters

Deterministic Transitions

From Class	Begins at (yr)	Succeeds to	After (years)
Early1:OPN	0	Mid1:OPN	50

Mid1:OPN	51	Mid1:CLS	150
Mid1:CLS	151	Late1:CLS	225
Late1:CLS	226	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
Replacement Fire	Early1:OPN	Early1:OPN	0.005	200	No	0
Wind or Weather or Stress	Early1:OPN	Early1:OPN	0.03	33	No	0
Surface Fire	Mid1:OPN	Mid1:OPN	0.002	500	No	0
Replacement Fire	Mid1:OPN	Early1:OPN	0.002	500	Yes	0
Mixed Fire	Mid1:OPN	Mid1:OPN	0.007	143	No	0
Wind or Weather or Stress	Mid1:OPN	Mid1:OPN	0.03	33	No	0
Surface Fire	Mid1:CLS	Mid1:CLS	0.002	500	No	0
Mixed Fire	Mid1:CLS	Mid1:CLS	0.002	500	No	0
Replacement Fire	Mid1:CLS	Early1:OPN	0.002	500	Yes	0
Wind or Weather or Stress	Mid1:CLS	Mid1:CLS	0.03	33	No	0
Surface Fire	Late1:CLS	Late1:CLS	0.002	500	No	0
Replacement Fire	Late1:CLS	Early1:OPN	0.005	200	Yes	0
Optional 1	Late1:CLS	Mid1:CLS	0.02	50	Yes	0
Wind or Weather or Stress	Late1:CLS	Late1:CLS	0.03	33	No	0

Optional Disturbances

Optional 1: Drought + Insects

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