10500

Rocky Mountain Lodgepole Pine Forest

BpS Model/Description Version: Aug. 2020

|  |  |  |  |
| --- | --- | --- | --- |
| **Modelers** |  | **Reviewers** |  |
| Sarah Heide | sarah\_heide@blm.gov | Louis Provencher | lprovencher@tnc.org |
| None | None |  |  |
| None | None | None | None |

Vegetation Type

Forest and Woodland

Map Zones

18

Geographic Range

South-central WY, south in the Front Ranges and interior ranges, west to the White River Plateau and northern Gunnison Basin. Also occurs in the Northern Rockies, north of the Red Desert, and UT High Plateau. The occurrence of lodgepole pine is minimal and probably only mappable in the extreme northeast portion of MZ18.

Biophysical Site Description

Subalpine cold climate, relatively moist but precipitation usually comes in the winter months as snow. Soils are usually excessively well-drained, residual or glacial till and alluvium on valley floors where there is cold air accumulation, warm and droughty shallow soils over fractured quartzite bedrock, coarse fraction 20-30% in soil, shallow soil (effectively 1-2 in) to broken rock or bedrock and shallow moisture-deficient soils with a significant component of volcanic ash. Soils are acidic, and rarely formed from calcareous parent materials. Precipitation 400-900 mm/yr.

Vegetation Description

These forests are dominated by *Pinus contorta* with shrub, grass or barren understories. Sometimes there are intermingled mixed conifer/*Populus tremuloides* stands with the latter occurring with inclusions of deeper, typically fine-textured soils. The shrub stratum may be conspicuous to absent; common species include *Arctostaphylos uva-ursi*, *Ceanothus velutinus*, *Mahonia repens*, *Purshia tridentata*, *Spiraea betulifolia*, *Spiraea douglasii*, *Shepherdia canadensis*, *Vaccinium caespitosum*, *Vaccinium* spp., *Symphoricarpos oreophilus*, *Ribes viscossissimum*, *Sambucus cerluea*, *Pachistima myrinsites*, *Salix scouleriama*, *Prunus virginianus*, and *Penstomon fruiticolosa*. Grasses include *Elymus glauccus*, *Poa wheeleri*, *Carex geyeri*, and *Carex hoodii*. Dominant forbs are *Arnica cordifolia* and *Hieracium alboflorum*.

BpS Dominant and Indicator Species

|  |  |  |
| --- | --- | --- |
| **Symbol** | **Scientific Name** | **Common Name** |
| PICO | *Pinus contorta* | Lodgepole pine |
| VASC | *Vaccinium scoparium* | Grouse whortleberry |
| VAMYO | *Vaccinium myrtillus var. oreophilum* | Whortleberry |
| VASC | *Vaccinium scoparium* | Grouse whortleberry |
| ABLA | *Abies lasiocarpa* | Subalpine fir |

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

Disturbance Description

These are subalpine forests where the dominance of *Pinus contorta* is related to fire history and topo-edaphic conditions. Following stand-replacing fires, Pinus contorta will rapidly colonize and develop into dense, even-aged stands. For the northeast corner of MZ18, the mean FRI is variable depending on elevation, precipitation, and temperature. Some *Pinus contorta* forests will persist on sites that are too extreme for other conifers to establish.

Fire Frequency

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Severity** | **Avg FI** | **Percent of All Fires** | **Min FI** | **Max FI** |
| Replacement | 149 | 81 | 90 | 300 |
| Moderate (Mixed) |  |  |  |  |
| Low (Surface) | 636 | 19 |  |  |
| All Fires | 121 | 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

Isodiametric stands are mostly small (100s of acres) in the southern portion of MZ18 but reach into the 1,000s of acres in the northeastern portion of the map zone. Patches of this BpS usually correspond to patches of habitat (well-drained to excessively well-drained soils) in the subalpine zone. Although fire size could be large in other parts of the western US, in eastern CA, NV, south-central ID and western UT, patches of this type were small enough to keep fire size within 100ac. Fires in the northeast corner of MZ18 are larger in size (100-1,000s of acres)

Adjacency or Identification Concerns

Lodgepole pine stands may be too small to be mappable in the southern portion of MZ18.

Persistent lodgepole pine stands in the montane and lower subalpine zones, that are on less well-drained soils, are usually seral to mixed conifer or subalpine BpS, including species such as Douglas-fir, white fir, Engelmann spruce, and subalpine fir.

Issues or Problems

Native Uncharacteristic Conditions

Comments

D Major made changes to vegetation class structural values in response to MTD v3.1 updates (K Pohl 7/18/05 request). These changes have not been reviewed and accepted by model developers as of 7/24/05.

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 | B | B |
| Tree | 5-10 | C | C | C | C | C | C | C | B | B | B |
| Tree | 10-25 | C | C | C | C | C | C | C | C | C | C |
| Tree | 25-50 | C | C | C | C | C | C | C | C | C | C |
| Tree | >50 | C | C | C | C | C | C | C | C | C | C |

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 19 Early Development 1 - All Structures

Indicator Species

|  |  |  |  |
| --- | --- | --- | --- |
| **Symbol** | **Scientific Name** | **Common Name** | **Canopy Position** |
| VASC | Vaccinium scoparium | Grouse whortleberry | Lower |
| RIVI | Ribes viburnifolium | Island gooseberry | Lower |
| CAGE2 | Carex geyeri | Geyer's sedge | Lower |
| PICO | Pinus contorta | Lodgepole pine | Upper |

Description

Grasses, forbs, low shrubs and lodgepole seedlings-saplings. If aspen is present, it grows faster and dominates lodgepole during this stage only. Cover of trees (seedlings-saplings) varies widely.

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

Class B 50 Mid Development 1 - Closed

Indicator Species

|  |  |  |  |
| --- | --- | --- | --- |
| **Symbol** | **Scientific Name** | **Common Name** | **Canopy Position** |
| PICO | Pinus contorta | Lodgepole pine | Upper |
| VASC | Vaccinium scoparium | Grouse whortleberry | Lower |
| CAGE2 | Carex geyeri | Geyer's sedge | Lower |
| ABLA | Abies lasiocarpa | Subalpine fir | Middle |

Description

Moderate to dense pole-sized trees, sometimes very dense (dog-hair). Aspen usually not present.

*Maximum Tree Size Class*  
Pole 5-9" DBH

Class C 31 Late Development 1 - Closed

Indicator Species

|  |  |  |  |
| --- | --- | --- | --- |
| **Symbol** | **Scientific Name** | **Common Name** | **Canopy Position** |
| PICO | Pinus contorta | Lodgepole pine | Upper |
| ABLA | Abies lasiocarpa | Subalpine fir | Mid-Upper |
| VASC | Vaccinium scoparium | Grouse whortleberry | Lower |
| CAGE2 | Carex geyeri | Geyer's sedge | Lower |

Description

Many mature lodgepole pine, somewhat patchy, variety of lodgepole size classes, open canopies overall but patches of denser trees.

*Maximum Tree Size Class*  
Medium 9-21"DBH

Model Parameters

Deterministic Transitions

|  |  |  |  |
| --- | --- | --- | --- |
| **From Class** | **Begins at (yr)** | **Succeeds to** | **After (years)** |
| Early1:ALL | 0 | Mid1:CLS | 19 |
| Mid1:CLS | 20 | Late1:CLS | 79 |
| Late1:CLS | 80 | Late1:CLS | 499 |

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:ALL | Early1:ALL | 0.005 | 200 | Yes | 0 |
| Competition or Maintenance | Mid1:CLS | Mid1:CLS | 0.002 | 500 | No | 0 |
| Replacement Fire | Mid1:CLS | Early1:ALL | 0.005 | 200 | Yes | 0 |
| Insects or Disease | Mid1:CLS | Mid1:CLS | 0.013 | 77 | No | 0 |
| Surface Fire | Late1:CLS | Late1:CLS | 0.005 | 200 | No | 0 |
| Replacement Fire | Late1:CLS | Early1:ALL | 0.01 | 100 | Yes | 0 |
| Insects or Disease | Late1:CLS | Early1:ALL | 0.013 | 77 | Yes | 0 |

References

Buechling, A. and W.L. Baker. 2004. A fire history of tree rings in a high-elevation forest of Rocky Mountain National Park. Canadian Journal of Forest Research 34: 1259-1273.

Bureau of Land Management. 2004. Fire, fuels, and related vegetation management direction plan amendment and environmental impact statement. Draft. Upper Snake River District. Idaho Falls, Idaho.

Johnston, B.C., L. Huckaby,T.J. Hughes and J. Pecor. 2001. Ecological types of the Upper Gunnison Basin: Vegetation-Soil-Landform-Geology-Climate-Water land classes for natural resource management. Technical Report R2-RR-2001-01. Lakewood, CO: USDA Forest Service, Rocky Mountain Region. 858 pp.

Kaufmann, M.R. 1985. Annual transpiration in subalpine forests: large differences among four tree species. Forest Ecology and Management 13: 235-246.

Lotan, J.E., J.K. Brown and L.F. Neuenschwanger. 1985. Role of fire in lodgepole pine forests. Pp. 133-152 in D.M. Baumgartner, R.G. Krebill, J.T. Arno and G.F. Weetman, compilers and editors. Lodgepole pine: The species and its management. Pullman, WA: Washington State University, Cooperative Extension.

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

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

Smith, J.K. and W.C. Fischer. 1997. Fire ecology of the forest habitat types of northern Idaho. General Technical Report INT-GTR-363. Odgen, UT: Intermountain Research Station. 142 pp.