11600

Rocky Mountain Subalpine/Upper Montane Riparian Systems

BpS Model/Description Version: Aug. 2020

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| --- | --- | --- | --- |
| **Modelers** |  | **Reviewers** |  |
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| None | None | None | None |
| None | None | None | None |

Vegetation Type

Woody Wetland

Map Zone

18

Geographic Range

Higher elevations of the Great Basin, Columbia Plateau, California, northern Rockies, and Pacific Northwest.

Biophysical Site Description

This ecological system represents the combination of numerous riparian types occurring in the upper montane/subalpine zones. Found at 1,500-3,500m (4,920-11,500ft). This ecological system exists as relatively small linear stringers.

Vegetation Description

This ecological system encompasses a broad array of riparian species. These systems are highly variable and generally consist of one or more of the following five basic vegetation forms: 1) cottonwoods; 2) willows and other shrubs; 3) sedges and other herbaceous vegetation; 4) aspen; and 5) conifers (primarily spruce and subalpine fir).

BpS Dominant and Indicator Species

|  |  |  |
| --- | --- | --- |
| **Symbol** | **Scientific Name** | **Common Name** |
| POPUL | *Populus* | Cottonwood |
| SALIX | *Salix* | Willow |
| POTR5 | *Populus tremuloides* | Quaking aspen |
| CAREX | *Carex* | Sedge |
| ABLA | *Abies lasiocarpa* | Subalpine fir |
| PICEA | *Picea* | Spruce |

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

Disturbance Description

Flooding events and availability of water during drier periods are the major influences to this system. Two-year flood events (wind/weather/stress) maintain vegetation but do not scour it, whereas seven-year events cause stand replacement of early successional vegetation. Larger flood events will cause stand replacement in mid-development vegetation dominated by pole-size trees (aspen, young conifers) and shrubs, whereas very large flooding events will cause the same effect in late-development vegetation dominated by large aspens and conifers.

The moisture associated with riparian areas promotes lower fire frequency compared with adjacent uplands and rapid recovery from fire events. Wet meadow types seldom burn. In riparian systems, the pre-burn herbaceous plant community is not permanently destroyed and rapidly recovers. Recovery is possible within a single growing season. Woody species (i.e., aspen, *Salix* spp., and occasionally cottonwood species) can be topkilled but generally resprout within a short period. In systems with conifers, post-fire establishment is from seed. Surface fire affected the early development class through a combination of replacement fire from uplands and occasional native burning. The total fire return interval (FRI) of high-elevation mixed aspen-conifer (BpS 161061\_b; 32yrs), which often has a Native American origin, was applied to mid-development vegetation, whereas the total FRI of Rocky Mountain Subalpine Mesic Spruce-Fir Forest and Woodland (BpS 161056; 212yrs) was used for late-development vegetation dominated by conifers.

In addition, beaver (*Castor canadensis*) were historically important in many of these systems. Beaver activity decreased with vegetation development.

Fire Frequency

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Severity** | **Avg FI** | **Percent of All Fires** | **Min FI** | **Max FI** |
| Replacement | 67 | 63 |  |  |
| Moderate (Mixed) |  |  |  |  |
| Low (Surface) | 113 | 37 |  |  |
| All Fires | 42 | 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

These systems are small linear features in the landscape.

Adjacency or Identification Concerns

This BpS includes narrow meadows, shrublands, and woodlands of conifers and aspen.

Over-grazing and irrigation use have had major impacts on some of these systems. This ecological system occurs at scales <30m resolution of LANDFIRE.

Issues or Problems

There is a paucity of fire information on this system, and the very heterogeneous nature of the systems is challenging for model-building.

Native Uncharacteristic Conditions

Because patches of aspen, shrubs, and trees can dominate, canopy cover can reach 100%.

Comments

BpS 181160 is based on important modifications to BpS 171160. A third vegetation class representing late-development conifer dominance was added to the original model. Flood events causing stand replacement were accordingly for early-, mid-, and late-development vegetation based on flooding dynamics for southern Rocky Mountains. The replacement FRI of mid- and late-development was set to the total FRI of BpS 161061\_b and 161056 as these are the systems most likely to surround or invade these high-elevation riparian systems. Similarly, an insect/ diseases disturbance was used in late-development because this also occurs in BpS 161056 during late-development.

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 | B | B | B | B | B | B | B | B | B | B |
| Tree | 5-10 | B | B | B | B | B | B | B | 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 44 Early Development 1 - All Structures

Indicator Species

|  |  |  |  |
| --- | --- | --- | --- |
| **Symbol** | **Scientific Name** | **Common Name** | **Canopy Position** |
| POPUL | Populus | Cottonwood | Upper |
| SALIX | Salix | Willow | Upper |
| CAREX | Carex | Sedge | Upper |
| PICEA | Picea | Spruce | Upper |

Description

Immediate post-fire responses in this ecological system are dependent on pre-burn vegetation form. Post-burn condition sensitive to scouring and blowout from floods. This class is shrub- or grass-dominated. Composition varies both within and among reaches. Generally, this class is expected to occur post-disturbance, but it can take longer for aspen and shrubs to dominate.

Flooding disturbances include 2yr events (modeled as weather-related stress) that do not scour and events that scour the young vegetation. Beaver reset succession by moving along the river with tree depletion. Replacement fire was typically rare and not included, whereas surface fire was more frequent and a combination of upland-driven fire and native burning. Succession is highly variable due to high moisture levels and high species variability.

*Maximum Tree Size Class*  
None

Class B 46 Mid Development 1 - Closed

Indicator Species

|  |  |  |  |
| --- | --- | --- | --- |
| **Symbol** | **Scientific Name** | **Common Name** | **Canopy Position** |
| POPUL | Populus | Cottonwood | Upper |
| SALIX | Salix | Willow | Mid-Upper |
| CAREX | Carex | Sedge | Lower |
| PICEA | Picea | Spruce | Mid-Upper |

Description

Highly dependent on the hydrologic regime and fire importation or native burning. Moderate period flood events cause stand replacement of pole-size aspen and other trees/shrubs. Beaver activity causes stand thinning in patches. Replacement fire sweeps through this system moderately frequently in mid-development. Conifers start to establish and will dominate after several decades.

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

Class C 10 Late Development 1 - Closed

Indicator Species

|  |  |  |  |
| --- | --- | --- | --- |
| **Symbol** | **Scientific Name** | **Common Name** | **Canopy Position** |
| PICEA | Picea | Spruce | Upper |
| POTR5 | Populus tremuloides | Quaking aspen | Mid-Upper |

Description

Riparian corridor dominated by conifers with understory of aspen or other *Populus* spp. Canopy cover can reach 100%, and conifers can reach 25m. Replacement fire occurs rarely. Major flood events and insects/disease cause stand replacement.

*Maximum Tree Size Class*  
None

Model Parameters

Deterministic Transitions

|  |  |  |  |
| --- | --- | --- | --- |
| **From Class** | **Begins at (yr)** | **Succeeds to** | **After (years)** |
| Early1:ALL | 0 | Mid1:CLS | 9 |
| Mid1:CLS | 10 | Late1:CLS | 59 |
| Late1:CLS | 60 | 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** |
| Optional 2 | Early1:ALL | Early1:ALL | 0.014 | 71 | Yes | 0 |
| Surface Fire | Early1:ALL | Early1:ALL | 0.02 | 50 | No | 0 |
| Optional 1 | Early1:ALL | Early1:ALL | 0.1 | 10 | Yes | 0 |
| Wind or Weather or Stress | Early1:ALL | Early1:ALL | 0.5 | 2 | No | 0 |
| Wind or Weather or Stress | Mid1:CLS | Early1:ALL | 0.02 | 50 | Yes | 0 |
| Replacement Fire | Mid1:CLS | Early1:ALL | 0.031 | 32 | Yes | 0 |
| Optional 1 | Mid1:CLS | Mid1:CLS | 0.05 | 20 | No | 0 |
| Insects or Disease | Late1:CLS | Early1:ALL | 0.004 | 250 | Yes | 0 |
| Replacement Fire | Late1:CLS | Early1:ALL | 0.0048 | 208 | Yes | 0 |
| Wind or Weather or Stress | Late1:CLS | Early1:ALL | 0.01 | 100 | Yes | 0 |

Optional Disturbances

Optional 1: Beaver

Optional 2: Scouring flood

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