11600

Rocky Mountain Subalpine/Upper Montane Riparian Systems

BpS Model/Description Version: Aug. 2020

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| --- | --- | --- | --- |
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Vegetation Type

Woody Wetland

Map Zones

10, 19

Geographic Range

Higher elevations of the Great Basin, 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. It is found at 1,500m-3,500m (4,920ft-11,500ft). This ecological system typically exists as relatively small, linear stringers, but can occupy relatively wide and flat valleys.

Vegetation Description

This ecological system encompasses a broad array of riparian species. These systems are highly variable and generally consist of willow and other shrubs, sedges, and other herbaceous vegetation or conifer (primarily spruce and subalpine fir). Shrubs include bog birch, bog blueberry, and low willow (e.g., *Salix planifolia*, *S. wolfii*, *S. glauca*, *S. commutate*, and *S. eastwoodia*), among others. Graminoids include bluejoint reedgrass, Holm sedge, and water sedge, among others.

Unlike the lower elevation riparian types (1159, Rocky Mountain Subalpine Lower Montane Riparian Systems), this type does not typically include cottonwood species, but may include paper birch and aspen.

BpS Dominant and Indicator Species

|  |  |  |
| --- | --- | --- |
| **Symbol** | **Scientific Name** | **Common Name** |
| 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 on this system, as a function of slope. Five-year flood events maintain vegetation but do not scour it, whereas 100-yr events scour and reset succession to early development, depending on vegetation. Flat-valley-bottom systems store and release water slowly throughout the growing season, whereas narrow, steep systems have little to no lateral floodplain development and water is transported downstream rapidly through step-pool channels. In the latter situation, larger materials (boulders, bedrock, and large woody debris) typically armor the banks and maintain channel form, even during larger flooding events. Vegetation is less critical in these systems; however, it is the primary armoring agent in low-gradient valley-bottom systems.

The moisture associated with riparian areas promotes lower fire frequency compared to 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 recovers rapidly. Recovery is possible within a single growing season. Woody species (i.e., aspen, *Salix* spp., and occasionally cottonwood species) can be top-killed, but generally resprout within a short period. In systems with conifer, post-fire establishment is from seed. Willow regenerate from seed if bare, wet mineral soil is present (i.e., stream bars), but they also sprout vigorously after fire. Older vegetation experienced fire when replacement fires burned the uplands. Surface fire affected the Early Development class through a combination of replacement fire from uplands and occasional native burning.

Fire Frequency

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Severity** | **Avg FI** | **Percent of All Fires** | **Min FI** | **Max FI** |
| Replacement | 198 | 40 |  |  |
| Moderate (Mixed) | 132 | 60 |  |  |
| Low (Surface) |  |  |  |  |
| All Fires | 79 | 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 or relatively wide features in the landscape.

Adjacency or Identification Concerns

This biophysical setting (BpS) includes narrow to moderately wide meadows, shrublands, and woodlands of conifers and aspen.

Overgrazing and irrigation use have had major impacts on some of these systems. This ecological system occurs at scales below 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. However, most of the shrubs and graminoids respond favorably to fire by resprouting from the root crown.

Native Uncharacteristic Conditions

Comments

Models are descriptions for map zone (MZ) 10 and MZ19; they were identified as duplicates during the BpS review process. The description for MZ10 was used for both MZs.

An additional reviewer was Steve Barrett (sbarrett@mtdig.net). Peer review resulted in changes to the fire regime (mixed-severity fire was added, surface fire was eliminated, and the overall mean fire return interval was lengthened) and overall proportions in Classes A and B.

This model was adopted from MZs 12 and 17, which was adopted as-is from MZ16. The model for MZ16 was developed by Charles Kay (ckay@hass.usu.edu) and Don Major ([dmajor@tnc.org](mailto:dmajor@tnc.org)).

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 | B | B | B | B | B | B | B | B | B | B |
| Tree | 25-50 | B | B | B | B | B | B | B | B | B | B |
| Tree | >50 | B | B | B | B | B | B | B | B | B | B |

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 49 Early Development 1 - All Structures

Indicator Species

|  |  |  |  |
| --- | --- | --- | --- |
| **Symbol** | **Scientific Name** | **Common Name** | **Canopy Position** |
| 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/among stream reaches. In general, this class is expected to occur a few years post-disturbance. Re-establishment of conifer may require many years.

Flooding disturbances (modeled as weather-related stress) include events that do not scour and longer periodic events that reset the vegetation to age zero. 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 51 Mid Development 1 - Closed

Indicator Species

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

Description

Highly dependent on the hydrologic regime. For example, could include any combination of the five vegetation forms (1) cottonwoods, (2) willow, (3) sedges and other herbaceous vegetation, (4) aspen, and (5) conifer (primarily spruce and subalpine fir). Composition of adjacent uplands is the determining factor for future fire events. Conifer establishment in these higher elevation areas creates some opportunity for fire.

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

Model Parameters

Deterministic Transitions

|  |  |  |  |
| --- | --- | --- | --- |
| **From Class** | **Begins at (yr)** | **Succeeds to** | **After (years)** |
| Early1:ALL | 0 | Mid1:CLS | 24 |
| Mid1:CLS | 25 | Mid1: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:ALL | Early1:ALL | 0.005 | 200 | Yes | 0 |
| Mixed Fire | Early1:ALL | Early1:ALL | 0.0075 | 133 | No | 0 |
| Optional 2 | Early1:ALL | Early1:ALL | 0.02 | 50 | Yes | 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 |
| Replacement Fire | Mid1:CLS | Early1:ALL | 0.005 | 200 | Yes | 0 |
| Mixed Fire | Mid1:CLS | Mid1:CLS | 0.0075 | 133 | No | 0 |

Optional Disturbances

Optional 1: Beaver

Optional 2: 100-year flood events

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