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

8, 9

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. Found at 1,500,-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 willows 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*, *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, large woody debris) typically armor the banks and maintain channel form, even during larger flooding events. Vegetation, however, is less critical in these systems, but 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 it 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 fire burned the uplands (mean fire return interval [MFRI], 100yrs). Surface fire (MFRI, 50yrs) 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 | 202 | 40 |  |  |
| Moderate (Mixed) | 134 | 60 |  |  |
| Low (Surface) |  |  |  |  |
| All Fires | 80 | 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 conifer and aspen.

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

Issues or Problems

There is a paucity of fire information on this system, and the very heterogeneous nature of the system 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

Description and models for map zone (MZ) 8 and MZ09 were identified as duplicates. The description from MZ09 was used for this BpS in both MZs.

This model was imported directly from MZ10. 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 MFRI was lengthened) and overall proportions.

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 48 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 conditions are 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 very few years post-disturbance. Re-establishment of conifer may require 50-100yrs.

Flooding disturbances (modeled as weather-related stress) include 5-yr 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 52 Mid 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

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 a need for a fire disturbance.

*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:ALL | 24 |
| Mid1:ALL | 25 | Mid1:ALL | 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:ALL | Early1:ALL | 0.005 | 200 | Yes | 0 |
| Mixed Fire | Mid1:ALL | Mid1:ALL | 0.0075 | 133 | No | 0 |

Optional Disturbances

Optional 1: Beaver

Optional 2: 100-year flood events

References

Baker, W.L. 1988. Size-class structure of contiguous riparian woodlands along a Rocky Mountain river. Physical Geography 9(1): 1-14.

Baker, W.L. 1989a. Macro- and micro-scale influences on riparian vegetation in western Colorado. Annals of the Association of American Geographers 79(1): 65-78.

Baker, W.L. 1989b. Classification of the riparian vegetation of the montane and subalpine zones in western Colorado. Great Basin Naturalist 49(2): 214-228.

Baker, W.L. 1990. Climatic and hydrologic effects on the regeneration of Populus angustifolia James along the Animas River, Colorado. Journal of Biogeography 17: 59-73.

Crowe, E.A. and R.R. Clausnitzer. 1997. Mid-montane wetland plant associations of the Malheur, Umatilla, and Wallowa-Whitman national forests. USDA Forest Service, Pacific Northwest Region. Technical Paper R6-NR-ECOL-TP-22-97.

Dwire, K.A., S.E. Ryan, L.J. Shirley, D. Lytjen and N. Otting. 2004. Recovery of riparian shrubs following wildfire: Influence of herbivory. In Riparian Ecoystems and Buffers: Multi-scale structure, function, and management. AWRA Summer Specialty Conference, Olympic Valley, California. 28-30 June 2004.

Kittel, G.M. 1994. Montane vegetation in relation to elevation and geomorphology along the Cache la Poudre River, Colorado. Unpublished thesis, University of Wyoming, Laramie.

Kittel, G., R. Rondeau, N. Lederer and D. Randolph. 1994. A classification of the riparian vegetation of the White and Colorado River basins, Colorado. Final report submitted to Colorado Department of Natural Resources and the Environmental Protection Agency. Colorado Natural Heritage Program, Boulder. 166 pp.

Kittel, G., R. Rondeau and A. McMullen. 1996. A classification of the riparian vegetation of the Lower South Platte and parts of the Upper Arkansas River basins, Colorado. Submitted to Colorado Department of Natural Resources and the Environmental Protection Agency, Region VIII. Prepared by Colorado Natural Heritage Program, Fort Collins. 243 pp.

Kittel, G., R. Rondeau and S. Kettler. 1995. A classification of the riparian vegetation of the Gunnison River Basin, Colorado. Submitted to Colorado Department of Natural Resources and the Environmental Protection Agency. Prepared by Colorado Natural Heritage Program, Fort Collins. 114 pp.

Kittel, G., E. Van Wie, M. Damm, R. Rondeau, S. Kettler and J. Sanderson. 1999a. A classification of the riparian plant associations of the Rio Grande and Closed Basin watersheds, Colorado. Unpublished report prepared by the Colorado Natural Heritage Program, Colorado State University, Fort Collins.

Kittel, G., E. Van Wie, M. Damm, R. Rondeau, S. Kettler, A. McMullen and J. Sanderson. 1999b. A classification of riparian and wetland plant associations of Colorado: A user's guide to the classification project. Colorado Natural Heritage Program, Colorado State University, Fort Collins CO. 70 pp. plus appendices.

Kovalchik, B.L. 1987. Riparian zone associations - Deschutes, Ochoco, Fremont, and Winema national forests. USDA Forest Service Technical Paper 279-87. Pacific Northwest Region, Portland, OR. 171 pp.

Kovalchik, B.L. 1993. Riparian plant associations on the national forests of eastern Washington - Draft version 1. USDA Forest Service, Colville National Forest, Colville, WA. 203 pp.

Kovalchik, B.L. 2001. Classification and management of aquatic, riparian and wetland sites on the national forests of eastern Washington. Part 1: The series descriptions. 429 pp. plus appendix. [http://www.reo.gov/col/wetland\_classification/wetland\_classification.pdf]

Manning, M.E., and W.G. Padgett. 1995. Riparian community type classification for Humboldt and Toiyabe national forests, Nevada and eastern California. USDA Forest Service, Intermountain Region. 306 pp.

Muldavin, E., P. Durkin, M. Bradley, M. Stuever and P. Mehlhop. 2000. Handbook of wetland vegetation communities of New Mexico: Classification and community descriptions (volume 1). Final report to the New Mexico Environment Department and the Environmental Protection Agency prepared by the New Mexico Natural Heritage Program, University of New Mexico, Albuquerque, NM.

Nachlinger, J., K. Sochi, P. Comer, G. Kittel and D. Dorfman. 2001. Great Basin: An ecoregion-based conservation blueprint. The Nature Conservancy, Reno, NV. 160 pp. plus appendices.

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

Neely, B., P. Comer, C. Moritz, M. Lammerts, R. Rondeau, C. Prague, G. Bell, H. Copeland, J. Jumke, S. Spakeman, T. Schulz, D. Theobald and L. Valutis. 2001. Southern Rocky Mountains: An ecoregional assessment and conservation blueprint. Prepared by The Nature Conservancy with support form the USDA Forest Service, Rocky Mountain Region, Colorado Division of Wildlife, and Bureau of Land Management.

Padgett, W.G. 1982. Ecology of riparian plant communities in southern Malheur National Forest. Unpublished thesis, Oregon State University, Corvallis. 143 pp.

Padgett, W.G., A.P. Youngblood and A.H. Winward. 1988a. Riparian community type classification of Utah and southeastern Idaho. Research Paper R4-ECOL-89-0. USDA Forest Service, Intermountain Region, Ogden, UT.

Padgett, W.G., A.P. Youngblood and A.H. Winward. 1988b. Riparian community type classification of Utah. USDA Forest Service, Intermountain Region Publication R4-ECOL-88-01. Ogden, UT.

Rondeau, R. 2001. Ecological system viability specifications for Southern Rocky Mountain ecoregion. First Edition. Colorado Natural Heritage Program, Colorado State University, Fort Collins, CO. 181 pp.

Szaro, R. C. 1989. Riparian forest and scrubland community types of Arizona and New Mexico. Desert Plants Special Issue 9(3-4): 70-139.

Tuhy, J., P. Comer, D. Dorfman, M. Lammert, B. Neely, L. Whitham, S. Silbert, G. Bell, J. Humke, B. Baker and B. Cholvin. 2002. An ecoregional assessment of the Colorado Plateau. The Nature Conservancy, Moab Project Office. 112 pp. plus maps and appendices.

Walford, G.M. 1996. Statewide classification of riparian and wetland dominance types and plant communities - Bighorn Basin segment. Report submitted to the Wyoming Department of Environmental Quality, Land Quality Division by the Wyoming Natural Diversity Database. 185 pp.