11590

Rocky Mountain Montane Riparian Systems

BpS Model/Description Version: Aug. 2020

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

Woody Wetland

Map Zone

22

Model Splits or Lumps

This biophysical setting (BpS) is lumped with 1160.

Geographic Range

Occurs specifically within the Bighorn Basin, Wyoming, and throughout the rest of map zone (MZ) 22. For the other MZs, it occurs in Great Basin, California, northern Rockies, Alaska, Pacific Northwest, and north-central regions.

Biophysical Site Description

This ecological system represents the combination of numerous riparian types occurring in the lower montane zone or foothills and alluvial systems below 7,000ft. Generally, these are high-gradient streams. Representatives of this riparian system may merge with the Western Great Plains Floodplain System (BpS 1162) at lower elevations in the northern and central part of MZ22. It occurs as relatively small stringers in the fire management landscape, and the vegetative community is highly dependent upon the gradient and hydrologic regime.

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) cottonwood, particularly narrowleaf cottonwood (*Populus angustifolia*) throughout the MZ, and balsam poplar (*Populus balsamifera*) along the northwestern edge; (2) willow; (3) sedges and other herbaceous vegetation; (4) aspen and shrubs (dogwood and buffaloberry); and (5) conifers (primarily juniper and Douglas-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 |
| JUSC2 | *Juniperus scopulorum* | Rocky mountain juniper |
| BEOC2 | *Betula occidentalis* | Water birch |
| PSEUD7 | *Pseudotsuga* | Douglas-fir |

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

Disturbance Description

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 (e.g., balsam popular and primarily *Salix* spp. and cottonwood species) can be top-killed, but generally resprout within a short period. In systems with juniper and Douglas-fir, shrubs and species of *Salicacea* become established. Hydrologic events are the major disturbance agents in these systems. Beaver (*Castor canadensis*) were historically important in many of these systems, however they are not as abundant as they once were. Older vegetation experienced fire and mortality by beaver. When replacement fire occurred, it 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 behavior in these systems is strongly influenced by the adjacent uplands. Hydrologic processes (e.g., flooding) are the determining factors in these systems.

Fire Frequency

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Severity** | **Avg FI** | **Percent of All Fires** | **Min FI** | **Max FI** |
| Replacement | 276 | 23 |  |  |
| Moderate (Mixed) |  |  |  |  |
| Low (Surface) | 81 | 77 |  |  |
| All Fires | 63 | 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 type is very similar to Rocky Mountain Upper Montane/Subalpine Riparian Systems (161160), and the VDDT models are identical.

This type is associated with basin big sagebrush models. Representatives of this riparian system may merge with the Western Great Plains Floodplain System (BpS 1162) at lower elevations in the northern and central part of MZ22. Overgrazing and irrigation use have had major impacts on some of these systems. Tamarisk and Russian olive have invaded. Currently, there has been a loss of beaver and a lessening of flooding events.

Issues or Problems

This ecological system occurs at scales below 30-m resolution of LANDFIRE. Incised channels and loss of beaver from the system have decreased the riparian width.

There is a paucity of information on this system.

Native Uncharacteristic Conditions

Comments

This model for MZ22 was adopted from the LANDFIRE model for the same BpS 1159 from MZs 24, 23, and 16 created by Charles Kay and Don Major. Descriptive modifications only were made for MZ22.

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 | B | B | B | B | B | B |
| Shrub | 0.5-1.0 | A | A | A | A | B | B | B | B | B | B |
| Shrub | 1.0-3.0 | A | A | A | A | B | B | B | B | B | B |
| Shrub | >3.0 | A | A | A | A | B | B | B | B | B | B |
| 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 63 Early Development 1 - All Structures

Upper Layer Lifeform is not the dominant lifeform

The dominant lifeform may vary between shrubs and herbaceous vegetation. The herbaceous layer may range in cover from 0-99% and in height from short (<0.5m) to tall (>1m).

Indicator Species

|  |  |  |  |
| --- | --- | --- | --- |
| **Symbol** | **Scientific Name** | **Common Name** | **Canopy Position** |
| POPUL | Populus | Cottonwood | Upper |
| SALIX | Salix | Willow | Upper |
| CAREX | Carex | Sedge | Low-Mid |
| CORNU | Cornus | Dogwood | Upper |

Description

Early-seral class dominated by shrubs or grass. Immediate post-fire responses in this ecological system are dependent on pre-burn vegetation form, and composition varies within the stream reach. Generally, this class is expected to last several years post-disturbance.

Replacement fire was typically rare and not included. Surface fire was more frequent, and a combination of upland-driven fire and native burning.

Beaver removed woody vegetation frequently. Two flooding disturbances were included: frequent flood events that did not cause a change in succession age (i.e., had no ecological setback or delay in succession) and larger flood events that revert the vegetation to the post-replacement stage.

The duration of this class is highly variable due to high moisture levels and greater species variability.

*Maximum Tree Size Class*  
None

Class B 37 Mid Development 1 - Closed

Upper Layer Lifeform is not the dominant lifeform

The dominant lifeform may also include trees, but will be highly variable. Canopy cover of trees may range from 0-30% and range in height from regenerative (<5m) to tall (25m-49m).

Indicator Species

|  |  |  |  |
| --- | --- | --- | --- |
| **Symbol** | **Scientific Name** | **Common Name** | **Canopy Position** |
| POPUL | Populus | Cottonwood | Upper |
| SALIX | Salix | Willow | Upper |
| CAREX | Carex | Sedge | Lower |
| CORNU | Cornus | Dogwood | Upper |

Description

The composition of this class is highly dependent on the hydrologic regime and presence of beaver. For example, it could include any combination of the vegetation forms described here. Composition of adjacent uplands is the determining factor for future fire events. Furthermore, conifer establishment in these higher elevation areas also influences MFRI; therefore, replacement fire was selected to characterize this disturbance.

*Maximum Tree Size Class*  
Large 21-33" 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** |
| Surface Fire | Early1:ALL | Early1:ALL | 0.02 | 50 | 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 | 0.01 | 100 | Yes | 0 |

Optional Disturbances

Optional 1: Beaver

Optional 2: 50-yr flood event

References

Cope, A.B. 1992. Carex aquatilis. In: Fire Effects Information System, [Online]. USDA Forest Service, Rocky Mountain Research Station, Fire Sciences Laboratory (Producer). Available: http://www.fs.fed.us/database/feis/ [2005, April 13].

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

Rassman, J.P. 1993. Prescribed fire effects in southwestern Montana, aspen dominated riparian areas. Thesis (M.S.)--Colorado State University, 154 pp.

Simonin, K.A. 2001. Populus angustifolia. In: Fire Effects Information System, [Online]. USDA Forest Service, Rocky Mountain Research Station, Fire Sciences Laboratory (Producer). Available: http://www.fs.fed.us/database/feis/ [2005, April 13].

Uchytil, R.J. 1991. Salix geyeriana. In: Fire Effects Information System, [Online]. USDA Forest Service, Rocky Mountain Research Station, Fire Sciences Laboratory (Producer). Available: http://www.fs.fed.us/database/feis/ [2005, April 13].