

**11590**

## **Rocky Mountain Montane Riparian Systems**

BpS Model/Description Version: Aug. 2020

| <b>Modelers</b>  |                     | <b>Reviewers</b> |      |
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| None             | None                | None             | None |

### **Vegetation Type**

Woody Wetland

### **Map Zone**

13

### **Geographic Range**

This system is found throughout the Rocky Mountains and Colorado Plateau regions. Biophysical Setting (BpS) is located in the eastern mountains of map zone (MZ) 13.

### **Biophysical Site Description**

This system occurs within a broad elevation range from ~900-2,800m and, therefore, is generally associated with mountain ranges and high plateaus of the eastern Mojave Desert. Occurrences are found within the flood zone of rivers, on islands, sand, or cobble bars, and immediate streambanks. They can form large, wide occurrences on mid-channel islands in larger rivers or narrow bands on small, rocky canyon tributaries and well-drained benches. This system is also typically found in backwater channels and other perennially wet but less scoured sites, such as floodplains swales. Surface water is generally high for variable periods. Soils are typically alluvial deposits of sand, clays, silts, and cobbles that are highly stratified with depth due to flood scour and deposition.

### **Vegetation Description**

This ecological system occurs as a mosaic of multiple communities that are tree-dominated with a diverse shrub component. Dominant trees may include *Populus angustifolia*, *Populus balsamifera*, *Populus fremontii*, or *Juniperus scopulorum*. Dominant shrubs include *Acer glabrum*, *Betula occidentalis*, *Cornus sericea*, *Prunus virginiana*, *Rhus trilobata*, *Salix exigua*, *Shepherdia argentea*, or *Rosa woodsii*. Generally, the adjacent upland vegetation surrounding this riparian system is different and ranges from grasslands to forests.

### **BpS Dominant and Indicator Species**

| <b>Symbol</b> | <b>Scientific Name</b>     | <b>Common Name</b>   |
|---------------|----------------------------|----------------------|
| POPUL         | <i>Populus</i>             | Cottonwood           |
| SALIX         | <i>Salix</i>               | Willow               |
| ROWO          | <i>Rosa woodsii</i>        | Woods' rose          |
| CAREX         | <i>Carex</i>               | Sedge                |
| ACGL          | <i>Acer glabrum</i>        | Rocky mountain maple |
| BEOC2         | <i>Betula occidentalis</i> | Water birch          |
| COSE16        | <i>Cornus sericea</i>      | Redosier dogwood     |

|      |                          |             |
|------|--------------------------|-------------|
| PRVI | <i>Prunus virginiana</i> | Chokecherry |
|------|--------------------------|-------------|

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

### Disturbance Description

This system is dependent on a natural hydrologic regime, especially annual to episodic flooding. Flood events of increasing magnitude will cause maintenance to stand-replacing disturbances; 7yr events for herbaceous and seedling cover, 20yr events for shrubs and pole-size trees, and 50yr events for mature trees. Although Hall (1946) describes a spotty distribution of beaver (*Castor canadensis*) in the Colorado River system (lower elevation than BpS 131159), this disturbance is not included as a significant factor as beaver is generally absent from the Mojave Desert.

Although fuel is continuous and abundant, it is high in moisture. Therefore, replacement fire sweeps through BpS 131154 and is caused by importation from adjacent systems, which may include basin big sagebrush (total fire return interval [FRI] of 50yrs), southern ponderosa pine woodlands (total FRI of 15yrs), black sagebrush (total FRI of 88yrs), and other types.

### Fire Frequency

| Severity         | Avg FI | Percent of All Fires | Min FI | Max FI |
|------------------|--------|----------------------|--------|--------|
| Replacement      | 68     | 100                  | 15     | 90     |
| Moderate (Mixed) |        |                      |        |        |
| Low (Surface)    |        |                      |        |        |
| All Fires        | 68     | 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 can exist as small- to medium-sized linear features in the landscape. In larger, low-elevation riverine systems, this system may exist as mid- to large patches.

### Adjacency or Identification Concerns

Exotic trees of *Elaeagnus angustifolia* and *Tamarix* spp, are common in some stands.

Livestock grazing is a major influence in the alteration of structure, composition, and function of the community.

### Issues or Problems

### Native Uncharacteristic Conditions

Tree cover can reach 100% in classes B and C for the pre-settlement condition. Canopy cover <40% in Class B and <50% in Class C are uncharacteristic conditions.

### Comments

BpS 131159 is based on BpS 171159, which was developed by Don Major (dmajor@tnc.org). Modifications to BpS 171159 for MZ13 are the removal of beaver browsing, changes to species composition, a recognition that BpS 131159 is a mountain riparian system more than a bottomland system (unlike BpS 171159), and the introduction of fire due to adjacent upland systems. BpS 131159 is very similar to BpS 131154 (Inter-Mountain Basins Montane Riparian Systems), except for differences in species composition and geographic range. Also, flood events

that caused stand replacement were greatly shortened to reflect similar dynamics to those of BpS 131155 (North American Warm Desert Riparian Systems, scour herbaceous cover, poles, and mature trees). As a result, flood events are one order of magnitude shorter than in the old model and more in line with literature. Also, the duration of Class B was reduced; cottonwood are pole-size within 10-20yrs after flooding.

## 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       | B                | B     | B     | B     | B       | B     | B     | B     | B     | B      |
| Tree                 | 0-5        | UN               | UN    | UN    | UN    | B       | B     | B     | B     | B     | B      |
| Tree                 | 5-10       | UN               | UN    | UN    | UN    | B       | B     | C     | C     | C     | C      |
| Tree                 | 10-25      | UN               | UN    | UN    | UN    | UN      | C     | C     | C     | C     | C      |
| Tree                 | 25-50      | UN               | UN    | UN    | UN    | UN      | C     | C     | C     | C     | C      |
| Tree                 | >50        | UN               | UN    | UN    | UN    | UN      | 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**      **27**      **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       | Lower           |

#### Description

Immediate post-disturbance responses are dependent on pre-disturbance vegetation composition. Typically shrub-dominated, but grass may co-dominate. *Salix* spp. dominates after fire, whereas *Populus* spp. and *Salix* spp. co-dominate after flooding. Silt, gravel, cobble, and woody debris may be common. Composition highly variable. Generally, this class is expected to occur a few years post-disturbance. Modeled disturbances include weather-related stress expressed as frequent annual flooding events.

Maximum Tree Size Class

None

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|                |           |                                 |
|----------------|-----------|---------------------------------|
| <b>Class B</b> | <b>52</b> | <b>Mid Development 1 - Open</b> |
|----------------|-----------|---------------------------------|

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Indicator Species

| Symbol | Scientific Name | Common Name | Canopy Position |
|--------|-----------------|-------------|-----------------|
| POPUL  | Populus         | Cottonwood  | Upper           |
| SALIX  | Salix           | Willow      | Mid-Upper       |

Description

Highly dependent on the hydrologic regime. Vegetation composition includes tall shrubs and small trees (cottonwood, aspen, conifers). Modeled disturbances include 1) weather-related stress expressed as flooding events, 2) less frequent flooding events (weather-related stress), and 3) occurrence of replacement fire.

Maximum Tree Size Class

Pole 5-9" DBH

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|                |           |                                    |
|----------------|-----------|------------------------------------|
| <b>Class C</b> | <b>21</b> | <b>Late Development 1 - Closed</b> |
|----------------|-----------|------------------------------------|

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Indicator Species

| Symbol | Scientific Name | Common Name | Canopy Position |
|--------|-----------------|-------------|-----------------|
| POPUL  | Populus         | Cottonwood  | Upper           |
| PINUS  | Pinus           | Pine        | Upper           |
| SALIX  | Salix           | Willow      | Mid-Upper       |

Description

This class represents the mature, large cottonwood, conifer, etc., woodlands. Major flooding events (weather-related stress) occur irregularly, whereas smaller floods occur more frequently. Replacement fire occurs.

Maximum Tree Size Class

Large 21-33" DBH

|                         |
|-------------------------|
| <b>Model Parameters</b> |
|-------------------------|

**Deterministic Transitions**

| From Class | Begins at (yr) | Succeeds to | After (years) |
|------------|----------------|-------------|---------------|
| Early1:ALL | 0              | Mid1:OPN    | 4             |
| Mid1:OPN   | 5              | Late1:CLS   | 19            |
| Late1:CLS  | 20             | Late1:CLS   | 999           |

**Probabilistic Transitions**

| <b>Disturbance Type</b>   | <b>Disturbance occurs In</b> | <b>Moves vegetation to</b> | <b>Disturbance Probability</b> | <b>Return Interval (yrs)</b> | <b>Reset Age to New Class Start Age After Disturbance?</b> | <b>Years Since Last Disturbance</b> |
|---------------------------|------------------------------|----------------------------|--------------------------------|------------------------------|------------------------------------------------------------|-------------------------------------|
| Wind or Weather or Stress | Early1:ALL                   | Early1:ALL                 | 0.14                           | 7                            | Yes                                                        | 0                                   |
| Replacement Fire          | Mid1:OPN                     | Early1:ALL                 | 0.02                           | 50                           | Yes                                                        | 0                                   |
| Wind or Weather or Stress | Mid1:OPN                     | Early1:ALL                 | 0.05                           | 20                           | Yes                                                        | 0                                   |
| Wind or Weather or Stress | Mid1:OPN                     | Mid1:OPN                   | 0.2                            | 5                            | No                                                         | 0                                   |
| Wind or Weather or Stress | Late1:CLS                    | Early1:ALL                 | 0.02                           | 50                           | Yes                                                        | 0                                   |
| Replacement Fire          | Late1:CLS                    | Early1:ALL                 | 0.02                           | 50                           | Yes                                                        | 0                                   |
| Wind or Weather or Stress | Late1:CLS                    | Mid1:OPN                   | 0.05                           | 20                           | Yes                                                        | 0                                   |

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