## Montane Riparian (MRIP)

### General Information

### Cover Type Overview

* Crosswalks
  + EVeg: Regional Dominance Type 1
    - Riparian Mixed Hardwood
    - White Alder
    - Willow
    - Black Cottonwood
    - Willow - Alder
    - Mountain Alder
    - Willow (Shrub)
  + EVeg: Regional Dominance Type 2
    - Any
  + LandFire BpS Model: 0611520 California Montane Riparian Systems

Reviewed by:

* Sarah Sawyer, Assistant Pacific Southwest Regional Ecologist, USDA Forest Service

### Vegetation Description

This system often occurs as a highly variable mosaic of multiple communities that are tree-dominated with a diverse shrub component. The variety of plant associations connected to this system reflect elevation, stream gradient, floodplain width, and flooding events. Usually, the montane riparian zone occurs as a narrow, often dense grove of broad-leaved, winter deciduous trees with a sparse understory. At high mountain elevations, there are usually more shrubs in the understory. At high elevations, the type may not be well developed or may occur in the shrub stage only (LandFire 2007, Grenfell 1988). Due to the methodology of assigning the landscape to particular landcover types, the montane riparian type is limited to those sites determined to be dominated by the species assemblages listed in the above crosswalk section. While we recognize that the riparian zone commonly includes areas near watercourses that are dominated by conifers and other trees, for the purposes of this model those sites have been sorted into the pertinent landcover type in accordance with the dominant vegetation observed. We do not have the capacity at this time to groundtruth or map riparian zones based on understory or midstory vegetation.

Characteristic species are many, including those from the following genera: *Acer, Alnus, Cornus, Populus, Rhododendron,* and *Salix*. These habitats can occur as *Alnus* or *Salix* stringers along streams of seeps. In other situations an overstory of *Populus* and/or *Alnus* may be present (Grenfell 1988). Other tree species may include *Pseudotsuga menziesii*, *Platanus racemosa*, and *Quercus agrifolia*. At lower elevations, the riparian areas may contain *Arbutus menziesii*, *Lithocarpus densiflorus*, *Umbellularia californica*, *Cornus*, *Acer* and *Fraxinus*. *Salix* species are common throughout, following a series of species as elevation increases (LandFire 2007).

### Distribution

MRIP is associated with montane lakes, ponds, seeps, bogs and meadows as well as rivers, streams and springs. Water may be permanent or ephemeral. The transition between MRIP and adjacent non-riparian vegetation may be abrupt, especially where the topography is steep. Typically, this vegetation type occurs below 2440 m (8000 ft) (Grenfell 1988).

**Disturbances**

### Wildfire

Fire frequency is highly variable within the riparian zone. Factors that include but are not limited to topography, elevation, climate, dominant vegetation, and existing vegetation all affect fire frequency and intensity. Riparian zones are heavily influenced by the fire regime of adjacent landcover types and so are still susceptible to disturbance by wildfire, even frequent and high mortality fires. Streams also act as an inhibitor of fire spread, thus contributing to spatial and temporal diversity of landscapes beyond what their relative area would suggest (Grenfell 1988).

In some forested riparian areas, pre-fire suppression fire return intervals were likely lower than adjacent uplands, while in others, fire frequency appears to have been comparable in riparian and upland areas. FRI values are shorter for riparian zones bordering narrow streams compared to zones around wider and deeper streams. In arid ecosystems, FRIs may be shorter than the surrounding areas in part because the increased productivity of these sites results in more fuels to carry fire. Lower elevation and adjacency to fire-tolerant vegetation also contribute to shorter FRIs for some riparian areas (Sawyer 2013).

Values for fire return intervals (FRIs) are available from a few review papers. Skinner and Chang (1996) aggregated FRIs from the Sierra Nevada and separated pre-1850 data from overall data. They report median FRIs of 36 years, with a minimum of 7 years and a maximum of 71 years. The LandFire model (2007) for this type predicts a mean FRI of 50 years. Replacement fire is predicted to have a mean FRI of 90 years and mixed fire a mean FRI of 115 years. We recalculated these BpS numbers using condition-specific information and using only high and low mortality fire categories, which resulted in an interval of 85 years for high mortality fire, 114 years for low mortality fire, and 49 years for any fire. Van de Water and North found FRIs ranging from 8-42 years with a mean of 17 years, using one method. Under a second method FRIs ranged from 10-87 years, with a mean of 30 years. We combined the BpS methodology with the results from Van de Water and North to derive the values in the table below.

Table 1. Fire return intervals (years) and percentage of high versus low mortality fires.

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Variant** | **Modifier** | **Fire Severity** | **Mean** | **Min** | **Max** | **% of Fires** |
| MRIP | None | High | 85 | – | – | 57 |
| Low | 114 | – | – | 43 |
| All Fires | 49 | 10 | 87 | 100 |

### Other Disturbance

Other disturbances are not currently modeled, but may, depending on the condition affected and mortality levels, reset patches to early development, maintain existing stages, or shift/accelerate succession to a more open stage.

### Vegetation Condition Classes

We recognize three separate condition classes for MRIP: Early Development (ED), Mid Development (MD), and Late Development (LD). We use condition classes not in the sense of fire regime condition classes, but as an alternative to “successional” classes that imply a linear progression of states and tend not to incorporate disturbance. The condition classes identified here are derived from a combination of successional processes and anthropogenic and natural disturbance, and are intended to represent a composition and structural condition that can be arrived at from multiple other conditions described for that landcover type. Thus our condition classes incorporate age, size, canopy cover, and vegetation composition as well as relative seral stages. In general, the delineation of stages has originated from the LandFire biophysical setting model descriptive of a given landcover type; however, condition classes are not necessarily identical to the classes identified in those models.

### Early Development (ED)

**Description** Immediate post-disturbance responses are dependent on pre-burn vegetation composition. Typically tree dominated, but shrubs may co-dominate. *Salix* and *Alnus* are common, though overall composition is highly variable (LandFire 2007).

**Succession Transition** In the absence of disturbance, patches in this condition will transition to MD at 10 years.

**Wildfire Transition** High mortality wildfire (100% of fires in this condition) recycles the patch through the ED condition. Low mortality wildfire is not modeled for this condition class.

**Mid Development (MD)**

**Description** Vegetation composition in this condition includes tall trees and shrubs. *Salix*, *Populus*, and *Alnus* are common. Patches in MD are more susceptible to fire than the early condition (LandFire 2007).

**Succession Transition** At 20 years without a wildfire-triggered transition, patches in this condition will succeed to LD.

**Wildfire Transition** High mortality wildfire (44.8% of fires in this condition) recycles the patch through the ED condition. Low mortality wildfire (55.2%) does not effect a change in the MD condition.

**Late Development (LD)**

**Description** This class represents the mature, large *Populus, Alnus*, etc. woodlands (LandFire 2007).

**Succession Transition** In the absence of disturbance, patches in this condition will maintain, regardless of soil characteristics.

**Wildfire Transition** High mortality wildfire (50% of fires) recycles the patch through the ED condition. Low mortality wildfire (50%) does not effect a change in the MD condition.

**Condition Classification**

Table 2. Classification of cover condition for MRIP. Diameter at Breast Height (DBH) and Cover From Above (CFA) values taken from EVeg polygons. DBH categories are: null, 0-0.9”, 1-4.9”, 5-9.9”, 10-19.9”, 20-29.9”, 30”+. CFA categories are not used for this condition because there is no “closed” vs. “open” differentiation. Each row in the table below should be read with a boolean AND across each column of a row.

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Cover Condition | Overstory Tree  Diameter 1 (DBH) | Overstory Tree  Diameter 2 (DBH) | Total Tree  CFA (%) | Conifer  CFA (%) | Hardwood  CFA (%) |
| Early | Null | any | any | any | any |
| Early | 0-9.9” |  |  |  |  |
| Mid | 10-19.9” | any | any | any | any |
| Late | 20-30”+ | any | any | any | any |

**Draft Model**

(See PDF) Disturbance-Succession model for MRIP.

**References**

Grenfell, Jr., William E. “Montane Riparian (MRI).” *A Guide to Wildlife Habitats of California*, edited by Kenneth E. Mayer and William F. Laudenslayer. California Deparment of Fish and Game, 1988. <http://www.dfg.ca.gov/biogeodata/cwhr/pdfs/MRI.pdf>. Accessed 4 December 2012.

LandFire. “Biophysical Setting Models.” Biophysical Setting 0611520: California Montane Riparian Systems. 2007. LANDFIRE Project, U.S. Department of Agriculture, Forest Service; U.S. Department of the Interior. <http://www.landfire.gov/national\_veg\_models\_op2.php>. Accessed 9 November 2012.

Sawyer, Sarah C. “Natural Range of Variation of Non-Meadow Riparian Habitat in the Bioregional Assessment Area” (unpublished paper, Ecology Group, Pacific Southwest Research Station, 2013).

Skinner, Carl N. and Chi-Ru Chang. “Fire Regimes, Past and Present.” *Sierra Nevada Ecosystem Project: Final report to Congress, vol. II, Assessments and scientific basis for management options*. Davis: University of California, Centers for Water and Wildland Resources, 1996.

Van de Water, Kip and Malcom North. “Fire history of coniferous riparian forests in the Sierra Nevada.” *Forest Ecology and Management* 260: 384-395. 2010.