11510

California Central Valley Riparian Woodland and Shrubland

BpS Model/Description Version: Aug. 2020

Vegetation Type

Mixed Upland and Wetland

Map Zones

4, 5

Geographic Range

Upper Sacramento River and major tributaries from near Redding, south to Sacramento-San Joaquin River Delta. San Joaquin River and major tributaries from near Fresno north to Stockton, lower Kings, Kaweah, Tule, and other rivers from Tulare and Kern Counties north to the Delta of Sacramento and San Joaquin.

Biophysical Site Description

Low-lying river and large stream channels and terraces from 0-500ft elevation in California. Substrate varies from cobbles and sand along active channels to deep silt deposits on natural levees away from active channels. Microtopography and landforms include point bars, backwater sloughs, oxbow lakes, natural levees, and stream terraces with minor topographic relief of from 1-6m above water level.

Vegetation Description

Important trees and shrubs include *Alnus rhombifolia*, *Populus fremontii*, *Platanus racemosa*, *Quercus lobata*, *Salix gooddingii*, *Salix laevigata*, *Salix lucida* ssp. *lasiandra*, *Salix exigua*, *Fraxinus latifolia*, *Acer negundo*, *Cephalanthus occidentalis*, and *Vitis californica*. *Juglans nigra* hybrids and *Ailanthus altissima* are problem invasive trees. *Tamarix* spp. extends as far north as Shasta County. Herbaceous components can include *Carex barbarae*, *Artemisia douglasiana*, and various marsh species along riverbanks and backwater (*Schoenoplectus californicus* [=*Scirpus californicus*], *Typha* spp.). *Arundo donax* is another common invasive. Structure is variable based on local site disturbance often initiated by point bar deposition and subsequent colonization by *Salix exigua*, *Populus fremontii*, and other *Salix* spp. The more mature stands of riparian forest on natural levees are often dominated by *Quercus lobata* with mixtures of *Acer negundo*, *Fraxinus latifolia*, and *Platanus racemosa*. Intermediate wetter stands have *Salix gooddingii* mixed with *Populus fremontii*, and some sloughs and backwater oxbow lakes have *Alnus rhombifolia*, *Cephlanthus*, *Salix lasiandra* ssp. *lucida*. Understory is variable but now often invaded by *Rubus discolor*. Natural older stands may have *Carex barbarae* as an understory, while recently disturbed stands may have *Rosa californica*, *Ribes auorum*, or *Rubus ursinus* as shrubby thickets. Other understory species in more mature stands include *Artemisia douglasiana*, *Bidens* spp., and *Toxicodendron diversilobum*.

BpS Dominant and Indicator Species

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

Disturbance Description

Primary disturbance regime is by flooding. New stands initiated by point-bar colonization on the active channels of larger streams and rivers. Flooding events are highly variable and may include local erosion and deposition in most years during winter or spring flooding events. Smaller floods (i.e., those smaller than a 10yr flood event) are responsible for maintaining the summer low water channel free of annually regenerating riparian hardwood seedlings. Major flooding events (i.e., those greater than a 10yr flood event) may scour away and re-set riparian vegetation growing along the active channel and low floodplain surfaces, while flooding and depositing fine silty sediments in established riparian forest farther from active channels. Fire events were likely rare and perhaps largely limited to Native American burning in adjacent marsh, upland grassland, and adjacent oak woodland.

Fire Frequency

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

This is a very limited view of a riparian system. The channel moves, and as the channel migrates into an old terrace or floodplain on one side, it leaves behind a new point bar and an incipient floodplain on the other. Places within the bankfull channel are typically erosive (scouring). The bankfull channel is defined as the area inundated by a 1.5-2yr recurrence flood event. Typically, in this type of riparian system, there is a distinct break in the channel bank between the floodplain and the active channel. The floodplain is typically depositional and is inundated by flows >1.5yrs in recurrence. Incipient floodplains become mature floodplains with further deposition.

All disturbances within the riparian corridor are largely created by the magnitude of stream discharge, local channel morphology, and valley confinement. Streamflow is a product of watershed size, so if a 10yr flood comes through, it will likely have similar impacts in reaches with similar channel morphology and confinement.

It is only on floodplains where the temporal period between large “resetting events” is long enough for other “gap-phase” disturbance regimes to be significant. These are important to the life history strategies of *Quercus lobata* and *Acer negundo*

Adjacency or Identification Concerns

Away from the active riparian zone, these forests and riparian scrubs may give way to a progressively more open woodland composed of *Quercus lobata*, *Q. douglasii*, or other trees. The transition from *Q. lobata* riparian forest to *Q. lobata* valley woodland was probably gradual in many areas, though extremely few natural transitions exist today. Currently the widespread urbanization of central valley bottomlands has fragmented the riparian habitat such that riparian stands can often be identified disjunct with the associated river and in agricultural fields.

Issues or Problems

Very little natural reference conditions remain, particularly on the landward edges of this type. Urbanization and the lack of large re-setting floods has fragmented a large percentage of this vegetation. The lack of reset also has affected the age and canopy structure within these stands, making them prone to exotic species invasion and fire.

Native Uncharacteristic Conditions

Most of this system is out of synch due to dams on most major river systems changing what was winter and spring delivery of sediment and flooding to a more even delivery of summer water without high flooding events. Non-native invasion of trees such as *Alianthus*, *hybrid Juglans*, *Tamarix* spp., *Arundo*, etc. has also changed species dynamics, particularly the *Arundo* invading the point bars and the *Juglans* invading older more stable forests.

Comments

Map zones 04 and 05 were combined during 2015 Biophysical Setting (BpS) Review.

In this model, annual flooding is represented as Option 1 and other flood events are represented as Wind/Weather/Stress pathways. In Classes A and C, 100yr and 20yr floods occur that re-set successional age, and these are represented by a single pathway with a combined probability of .06.

For LANDFIRE National, Todd Keeler-Wolf wrote the description for this BpS. Kori Blankenship created the VDDT model with input from Neil Sugihara. Review resulted in minor changes to the Adjacency or Identification Concerns, Scale Description, and Issues/Problems fields.

Succession Classes

**Mapping Rules**

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 14 Early Development 1 - Open

Indicator Species

Description

Point bar deposition followed by colonization of wind-dispersed woody species such as *Populus fremontii*, *Salix exigua*, *S. gooddingii*, *Salix laevigate*, and *S. lasiolepis*.

*Maximum Tree Size Class*  
None

Class B 49 Mid Development 1 - Open

Indicator Species

Description

Maturation of *P. fremontii* and *S. gooddingii* stands and in-filling by later seral riparian species such as *Acer negundo*, *Juglans californica* var. *hindsii* (*Juglans hindsii*).

*Maximum Tree Size Class*  
None

Class C 37 Late Development 1 - Closed

Indicator Species

Description

Slow colonization by *Quercus lobata* of these mature stands, with subsequent buildup of natural levee deposits derived from silt deposition in flooding backwaters farther from active channel. Gap-phase individual tree openings caused by liana buildup of *Vitis californica* and natural demise of older trees.

*Maximum Tree Size Class*  
None

Model Parameters

Deterministic Transitions

Probabilistic Transitions

Optional Disturbances

Optional 1: annual flood

References

Buer, K.Y., D. Forwalter, M. Kissel and B. Stohler. 1989. The middle Sacramento River: Human impacts on physical and ecological processes along a meandering river. In: Abel. D.L., technical coordinator. Proceedings of the California Riparian Systems Conference: protection, management and restoration for the 1990’s. Gen. Tech. Rep. PSW-110. Berkeley, CA: USDA Forest Service, Pacific Southwest Forest and Range Experiment Station. 22-32.

Busch, D.E. 1995. Effects of fire on Southwestern riparian plant community structure. Southwestern Naturalist 40: 259-267.

Cepello, S.A. 1991. Riparian vegetation distribution along the middle Sacramento River in relation to flood frequency. Thesis. Chico, CA: California State University.

Conard, S.G., R.L. MacDonald and R.F. Holland. 1980. Riparian vegetation and flora of the Sacramento Valley. In: Sands, A., ed. Riparian Forests in California: Their Ecology and Conservation. Insti. Ecol. Publ. No. 15. Davis, CA: University of California. 47-55.

Faber, P.M., ed. 2003. California Riparian Systems: Processes and Floodplain Management, Ecology, and Restoration. In: The Proceedings from the Riparian Habitat Joint Venture Conference: Integrating Riparian Habitat Conservation & Flood Management in California (December 4-6, 2007). Sacramento, CA.

Florsheim, J.L. and J.F. Mount. 2002. Restoration of floodplain topography by sand-splay complex formation in response to intentional levee breaches, Lower Cosumnes River, California. Geomorphology 44: 67-94.

Fremier, A. K. 2003. Floodplain Age Modeling Techniques to Analyze Channel Migration and Vegetation Patch Dynamics on the Sacramento River, California. MA thesis. Davis, CA: University of California.

Greco, S.E., R.E. Plant and R.H. Barrett. 2002. Geographic modeling of temporal variability in habitat quality of the yellow-billed cuckoo on the Sacramento River, miles 196-219, California. In: Scott, J.M., P.J. Heglund, F. Samson, J. Haufler, M. Morrison, M. Raphael and B. Wall eds. Predicting Species Occurrences: Issues of Accuracy and Scale. Covelo, CA: Island Press. 183-196.

Greco, S.E. 1999. Monitoring landscape change and modeling habitat dynamics of the yellow-billed cuckoo on the Sacramento River, California. Dissertation. Davis, CA: University of California.

Griggs, F.T. and T. Sperber. 2003. The interaction of biological and physical processes and the long-term survival of riparian forests at the San Joaquin River National Wildlife Refuge. CALFED Science Conference 2003. Abstracts: Advances in Science and Restoration in the Bay, Delta & Watershed.

Griggs, F.T. and G.H. Golet. 2002. Riparian valley oak (Quercus lobata) forest restoration on the Middle Sacramento River, California. Technical Report PSW-GTR-184. CA: USDA Forest Service

Harris, R.R. 1987. Occurrence of vegetation on geomorphic surfaces in the active floodplain of a California alluvial stream. American Midland Naturalist 118: 393-405.

Harris, R.R., C.A. Fox and R. Risser. 1987. Impacts of hydroelectric development on riparian vegetation in the Sierra Nevada region, California, USA. Environmental Management 11: 519-527.

Jones, W.M. 1997. Spatial patterns of woody plant regeneration in two California Central Valley floodplain forests. Thesis. MT: University of Montana.

Kirk, P. 2003. Hybridization of Juglans hindsii in Riparian Forests of Northern California. Masters Thesis. Chico, CA: Chico State University.

Kondolf, G.M., T. Griggs, E. Larson, S. McBain, M. Thompkins, J. Williams and J. Vick. 2000. Flow regime requirements for habitat restoration along the Sacramento River between Colusa and Red Bluff. CALFED Bay Delta Program Integrated Storage Investigation. Sacramento, CA.

Lowney, C.L., and S.E. Greco. 2003. Flood Frequency Analysis of the Sacramento River at Bend Bridge. Technical Memorandum prepared for the California Department of Water Resources, Northern District, Red Bluff, California. Davis, CA: Landscape Analysis and Systems Research Laboratory, Dept. of Environmental Design, University of California.

Mount, J.F. 1995. California Rivers and Streams. Berkeley, CA: University of California Press.

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

Robichaux, R. 1980. Geologic history of the riparian forests of California. In: Sands, A., ed. Riparian Forests in California: Their Ecology and Conservation. Insti. Ecol. Publ. No. 15. Davis, CA: University of California. 21-34

Stella, J.C., J. Vick and B. Orr. 2003. Riparian vegetation dynamics on the Merced River. In: Faber, P.M.,ed. 2003. California Riparian Systems: Processes and Floodplain Management, Ecology, and Restoration. 2001 Riparian Habitats and Floodplains Conference Proceedings, Riparian Habitat Joint Venture, Sacramento. 302-314.

Strahan, J. 1984. Regeneration of riparian forests of the Central Valley. In: Warner, R.E. and K.M. Hendrix, eds. California Riparian Systems: Ecology, Conservation, and Productive Management. Berkeley, CA: University of California Press. 58-67.

Thomsen, H.H. 1963. Juglans hindsii, the central California black walnut, native or introduced? Madrono 17: 1-32.

Tu, I.M. 2000. Vegetation patterns and processes of natural regeneration in periodically flooded riparian forests in the Central Valley of California. Dissertation. Davis, CA: University of California.

Vaghti, M.G. and S Greco. (In press 2006). Riparian Vegetation of the Great Valley. In: Barbour, M.G., T. Keeler-Wolf and A. Schoenherr, eds. Terrestrial Vegetation of California, third edition. Berkeley and Los Angeles, CA: University of California Press.

Warner, R.E. and K.M. Hendrix, eds. 1984. California Riparian Systems: Ecology, Conservation, and Productive Management. Berkeley, CA: University of California Press.