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Fire Regime Condition Class (FRCC) Interagency Handbook Reference Conditions

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Potential Natural Vegetation Group: Northern floodplain forest

Geographic Area: Eastern Montana east into Minnesota from North Dakota south to northern Oklahoma.

Description: Broadleaf deciduous forest associated with large river floodplains, such as the Missouri, Platte and Kansas rivers. These forests typically occur on the lower terraces of these major floodplains. This forest type is dominated by cottonwood (*Populus deltoides*), black willow (*Salix nigra*) or peach leaf willow (*S. amygdaloides*) and American elm (*Ulmus americanus*) (Bragg and Tatschl 1977, Johnson, et al 1976, MBSA 1983). Sometimes cottonwood occurs in pure stands or nearly pure stands (Garrison, et al 1977). Other species include sandbar willow (*S. interior*), box elder (*Acer negundo),* silver maple *(A. saccharinum),* hackberry *(Celtis occidentalis),* green ash *(Fraxinus americana)*, typically associated with later seral stages. Understory species may include dogwood ( ), poison ivy (*Rhus radicans*), buckbrush (*Symphoricarpos orbiculatus*). As the stand matures in the upper terraces, bur oak (*Quercus macrocarpa*, walnut (*Juglans nigra*), and sycamore establish.

Floodplain systems are produced and maintained by active hydro and geomorphic processes such as channel meandering, sedimentation and erosion (Gregory, et al. 1991, Hughes 1994) caused by natural hydrological variation (Richter and Richter 2000). Regeneration of the dominate species (cottonwood and willow) is dependent on flooding and movement of river channels, which creates bare, moist soil needed for seedling establishment (Noble 1979, Johnson et al. 1976, Scott, et al. 1997). Oxbow and slough development also influence the floodplain system and create variability in plant community composition. Deposits of sand and other sediments can create low ridges that influence vegetation establishment (Weaver 1960). The flood frequency in a given area is dependent upon its location on the floodplain, with upper terraces having infrequent flooding and scouring events, while the lower terraces nearest the river flood frequently. One study indicated 13 major floods in 108 year period between 1844 and 1952 on the Missouri River (MBSA 1983). Scott, et al. 1997 found that flood frequency was 9.2 years. Scouring caused by ice jams during the winter, channel meandering, oxbows and slough development greatly influence this system. Biological agents (beaver) also greatly impacted pre-European river systems.

Prior to significant alteration of river systems and other natural communities, these northern floodplain forests occurred irregularly as groves of trees or narrow bands along the lower terraces or adjacent to abandoned river channels, lakes and ponds of the floodplain, while the upper terraces were dominated by grasslands (Weaver 1960). Frequent fires in the adjacent grasslands and limited moisture availability kept woody species from moving out beyond the first terraces. Today, bank stabilization, dams and water diversion have significantly altered the northern floodplains

Fire Regime Description:

Fire is rare in northern floodplain forests, although fire in adjacent grasslands was frequent enough to prevent woody plant encroachment. This adjacent fire probably influenced northern floodplain forests during periods of drought and in the drier climates to the west. Cottonwoods and willows are all susceptible to fire and are often top-killed or damaged by fire (FEIS).

Cottonwood sprouting response appears weak and long-term survival is poor (Gom and Rood, 1999). Fire return intervals for adjacent grasslands are estimated to be 3-5 years.

Assumptions
We developed the VDDT model with the recognition that the northern floodplain forest (cottonwood-willow-elm community) is a seral community. This seral community is most affected by flooding and scouring and channel movement. We modeled the floodplain valley, although the model does not include wetlands, sloughs or oxbows.

We used two flooding regimes in the model:
Option 1 – minor flooding/scouring (5-20 year frequency)
Option 2 – major flooding/scouring (20-500 year frequency)

Flood frequency for a class is based on location on the floodplain, with higher terraces being subject to longer flood cycles (up to 500 years). We have not modeled attributes such as beaver activity, channel migration, oxbow and slough development or sedimentation.

We are treating meandering rivers (such as the Missouri) and braided rivers (such as the Platte) equally in the model. These two types of river have different fluvial processes and thus may need to be modeled separately in future iterations.

Vegetation Type and Structure

Class*	Percent of Landscape	Description
A: Herbaceous community	33.1	Pioneer community composed primarily of willow (sandbar, peach-leaved, black), and ruderal herbs Age 0-10 years.
B: young floodplain forest	11.2	This stage develops as the stand starts to mature. Dominate species are cottonwood, willow (sandbar, peach-leaved, black) and American elm. Age 10-30 years.
C Mature floodplain forest	3.4	Overstory is dominated by cottonwood, American elm, silver maple, red mulberry, box elder, and sycamore further south in the region. Understory species include dogwood and poison ivy. Age 30-100 years.
D Prairie	42.5	Prairie cordgrass may dominate, but other prairie species will also be present. This community is typically associated with higher terraces under a frequent fire regime.
E Mature Hardwood forest	9.8	Found along the upper terraces that have been protected from flooding and fire. Species composition increases towards south and east within NFF region. Overstory species include Hackberry, American elm, Ash (green and black*), Sycamore* Black Walnut*, Shagbark Hickory*, Oak* (bur, shingle), Basswood*, Ironwood*, Paw Paw*, Understory species include dogwood and poison ivy * found in the southern part of the region

Fire Frequency and Severity

Fire Severity	Fire Frequency (yrs)	Probability	Percent, All Fires	Description
Replacement Fire	5	0.2	90	Mostly in Class D, very infrequent in class C and E
Non-Replacement Fire	45	0.022	10	Occurs in class C and E and is primarily a result of

				fires occurring in the adjacent grassland community (class A).
All Fire Frequency*	4.5	0.22	100	

*All Fire Probability = sum of replacement fire and non-replacement fire probabilities. All Fire Fire Frequency = inverse of all fire probability (previous calculation).

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VDDT File Documentation

Include screen captures (print-screens) from any of the VDDT graphs that were used to develop reference conditions.

Model diagram: