

THE “COTTONWOOD CONUNDRUM” AND THE 2011 FLOOD ON THE MISSOURI RIVER

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ABSTRACT

Decades of flow regulation have contributed to declines in cottonwood (*Populus deltoides*) forests along many rivers in western North America. On the middle and upper Missouri, riparian forest area has declined by approximately 70% since the 1890s and remaining forests are dominated by older age classes (67% over 55 years old), with limited recruitment over the last three decades. Remaining forests are threatened by invasive species, disease and emerging insect pests, and the chronic effects of long-term flow regulation. A large flood in summer 2011, however, significantly impacted the Missouri River channel and its floodplain, with potential positive and negative effects on cottonwood forests. We investigated the effects of the flood by comparing pre- to post-flood changes in forest structure, land cover, and cottonwood seedling recruitment. Woody stem densities, particularly in shrubs/saplings and in younger forest age classes, declined significantly. Sandbar area increased sharply and the area of young forests (e.g., <15 years old) decreased (e.g., by 87% below Gavins Point Dam). Post-flood cottonwood recruitment was widespread, but occurred primarily on lower sandbar surfaces and was dominated by 2012 cohort seedlings, except below Fort Peck Dam in Montana, where flood recession patterns were more natural and significant overbank recruitment of 2011 seedlings occurred. Long-term potential for cottonwood forest expansion is limited by the geomorphic legacies of decades of flow regulation, unnatural flow patterns, and conflicting management goals. Ecosystem restoration efforts must address these constraints or look for opportunities in novel habitats (e.g., deltas) on the Missouri River system.