

SANDBAR FORMATION CAUSED BY THE 2011 FLOOD ON THE MISSOURI RIVER NEAR VERMILLION, SOUTH DAKOTA

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ABSTRACT

Missouri River flows have been highly regulated by dams since the 1950s, resulting in reduced peak flows, increased minimum flows, and disruption of sediment supply and transport regimes. Consequently, dams have greatly limited the formation of sandbar surfaces necessary for native cottonwood recruitment along the Missouri River. During the summer of 2011, record precipitation in the upper Missouri River basin resulted in unprecedented dam releases and prolonged high summer flows throughout the Missouri River system, creating favorable conditions for erosion and sandbar formation. The effects of the 2011 flood on sandbar formation were assessed for an approximately 28-kilometer reach of the Missouri River downstream of Gavins Point Dam near Vermillion, South Dakota. Landsat images of the study reach from 2010 and 2011 were classified using “heads-up” digitizing in ArcGIS 10 to calculate changes in the aerial extent of water, sand, and vegetation following the flood. An 1892 Missouri River Commission map of the study reach was similarly classified to provide a predam point of comparison. Sandbar area increased by nearly 500 percent between 2010 and 2011. Overlays of the digitized channel images indicated that channel movement was minimal between 2010 and 2011. Total sandbar area following the 2011 flood (1168 hectares) was similar to the amount of sandbar area in 1892 (1668 hectares), although there were major differences in the location and size distribution of sandbars between the two periods. The long-term benefits of the 2011 flood to cottonwood recruitment cannot be known without field studies in 2012 and beyond.