

Jain, V., Fryirs, K. and Brierley, G. 2008. Where do floodplains begin? The role of total stream power and longitudinal profile form on floodplain initiation processes. *Geological Society of America Bulletin*. 120, 127-141.

Abstract

Understanding downstream transitions in river character and behavior is a basic concept in fluvial geomorphology. Downstream patterns of depositional processes can be differentiated between channel and floodplain components. In this study a generic set of methods is used to analyze floodplain initiation and continuity in relation to downstream changes in total stream power (slope and discharge) and longitudinal profile form for river courses in the upper Hunter catchment, Australia. Absolute values of these controlling factors are shown to be poor indicators of threshold conditions at which floodplains begin to form along river courses. Catchment-scale patterns of stream power and the form of longitudinal profiles provide better predictors of this transitional zone. The total stream power plot derived along longitudinal profiles represented by a second-order exponential curve has a bimodal pattern. In most cases, floodplains begin to form in a transition zone characterized by a trough area within the bimodal stream power distribution. This bimodal stream power pattern provides a better means to identify this transition in depositional processes along longitudinal profiles than more conventional single peak stream power analyses based on first-order exponential longitudinal profiles. Indirect controls such as basin geology and accommodation space also influence the initiation and pattern of floodplains.