Geomorphic Lessons Learned from Floodplain Interactions and Urban Stream Natural Channel Restoration

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Abstract. Natural Channel Design as a method for stream restoration is limited in many applications related to dynamic floodplain interactions and urban channels. Stable streams are defined to be in a state of dynamic equilibrium that in many cases can't be achieved due to limitations in project goals and objectives. Changes is the hydrology, flow regime, sediment supply, slope and substrate can cause local channel instabilities that can lead to systematic reach wide instability and possible channel evolutions. Many stream restoration projects can be good examples and experimentations of the effect of changes in flow regimes that affect sedimentation and erosion rates. The major goal of stream restoration projects in the west mountain states are usually trying to create a stable restored channel that many times have unstable and conflicting boundary conditions to achieve a given function. The use of reference reaches have been limited to idealized boundary conditions and in practice is not applicable to transition reaches, floodplain shear stress/scour and high bedload systems in the southeast. Other goals of urban stream restoration projects include limiting flood risk, increase public use, increase habitat, property protection, mitigation and aesthetics. The dynamic equilibrium of a stable stream is not accepted in goals and objectives of many stream restoration projects. A process focused design for stream restoration will evaluate risk on multiple design flows that are at and above a bankfull stage.
This presentation will discuss many lessons learned from evaluating the geomorphic potential and departure analysis of a disturbed urban river system and restored river systems that have failed. The paper presents a method of evaluating risk related to sediment transport and routing and evaluating the uncertainty of an urban stream restoration. The paper also discusses recommendations and design tools to limit risk of failure on urban stream restoration projects. Finally a couple examples of high risk stream restoration projects and techniques for stabilization will be discussed and highlighted.

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