

Oral Presentation Abstract

Title: Capitalizing on Flooding as Passive Restoration: Hearts and Minds of the Musselshell

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Topic: Floodplain Connectivity

Abstract: The accommodation of flooding as a welcome ecological disturbance and a passive restoration measure is difficult in a social climate of rapid engineering response and resistance to geomorphic change. Although flood impacts can provide effective passive restoration gains, aggressive post-flood rehabilitation measures typically negate those gains. In spring of 2011, the Musselshell River of central Montana experienced unprecedented flooding that resulted in widespread damage to irrigation infrastructure, roads and bridges, residential structures, and agricultural fields. Flood-induced changes in Musselshell River morphology include 59 avulsions and abandonment of 37 miles of channel. An abandoned rail grade that served as an informal flood control levee was breached in 31 locations. The flood also rejuvenated habitat, created new floodplain area, re-connected historic floodplain area, created massive depressional wetlands, and removed fish passage barriers. These passive restoration gains followed historic impacts of straightening, riparian clearing, and chronic dewatering.

In an effort to characterize flood impacts and response strategies, the Musselshell Watershed Coalition assembled a River Assessment Triage Team (RATT) to provide a rapid, science based response to flood damages along 320 miles of the Musselshell River. The team was comprised of scientists with collective experience in geomorphology, fisheries, riparian systems, agricultural land uses, and water rights.

Site visits with 43 major landowners in the corridor included site specific evaluations of flood impacts and associated challenges, as well as collaborative identification of conservation opportunities. A primary objective of the response team was to convey the benefits of accommodating geomorphic and riparian post-flood evolution in an effort to minimize aggressive responses, and retain flexibility as the system continues to respond to the flood. As landowners closely watched the flood over its several week duration, they were able to provide key information such as event sequencing, thus developing ownership in the impact assessment. The cost of rehabilitation work was a major driver in landowner decision making, suggesting that rural, less affluent communities are more likely than other river-corridor dwellers to accommodate dramatic geomorphic change. As a result, many river corridor ranchers and farmers are adjusting their land uses to optimize corridor recovery, such as converting to mobile irrigation pumps, and actively protecting the hundreds of thousands of cottonwood seedlings that germinated following the flood. These activities have been supported by rapid actions by the local watershed coalition at the state and federal level, to establish programs that support flood-related ecological gains in a rural environment with limited financial resources.

The Musselshell River RATT team approach has the potential to provide an effective model for rapid post-flood on the ground work to capitalize on flooding as a passive restoration measure and minimize risk of investing in ineffective measures designed to restore pre-flood conditions. Critical components of this process include rapid response, direct communication with landowners, and agency support. The main challenge of the team was to convey the value of a No Action or minimally aggressive responses while acknowledging immense personal hardship, anxiety, and loss.