



## The impact of karst stream flow losses on flood plain mapping, Camden and Laclede Counties, Missouri, USA

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The U.S. Army Corps if Engineers, Kansas City District, in support of the U.S. Federal Emergency Management Agency (FEMA) Region VII, is mapping 1% probability flood plains for all streams draining greater than one square mile in area for four counties in the West Central Missouri. Watersheds in portions of these counties have developed in as much as 1,800 feet of carbonate bedrock. Harvey, Skelton and Miller, in their 1983 U.S. Geological Survey Water Resource Report, demonstrated that some tributaries in the Grandglaize Creek watershed lose all surface runoff from rainfall events of as much as 2 to 3 inches, over an area of 100 square miles, to a highly interconnected karst groundwater-surface water drainage system.

The purpose of this investigation is to evaluate whether channel losses in karst surface water-groundwater systems are sufficient to lower the 1% probability flood discharge and change the mapped 1% flood plain in the stream valleys. This will be done by applying a range of channel loss rates from known karst surface water-groundwater systems to existing hydraulic models of streams in the Grandglaize Creek watershed. Channel losses are currently neglected in these models.

A number of large tributaries in the Grandglaize Creek watershed are classified as losing streams by the Missouri Department of Natural Resources. Stream channels developed in these tributary valleys are evidence that surface flow does occurs in response to larger precipitation events even though the channels carry no discharge during moderate precipitation events. This suggests that large flows temporarily overwhelm the underlying drainage system and result in brief flash floods.

Since data on channel losses are generally unavailable because data collection of this

complexity is beyond the scope of county-wide, approximate flood plain mapping studies, we typically make a conservative assumption that channel losses are negligible compared to the volume of flow from the 1% probability flood event. The current county-wide flood plain mapping presents an opportunity to assess the validity of this assumption. Under this study, the authors will apply a simple HEC-RAS hydraulic model, and data available from the USGS Water Resource Report and data from similar karst systems in Missouri, to run a range of channels loss rates and assess whether channel losses are sufficient to change the 1% probability storm discharge and impact the flood plain mapping in the Grandglaize watershed.