

Stage-Frequency Analysis at St. Louis —How Best To Determine It?

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Abstract

The five Corps of Engineers Districts that comprise the upper Midwest, covering the Missouri and Mississippi River system upstream of the mouth of the Ohio River, completed a major technical study in 2004 which updated discharge and stage-frequency relationships for over 2000 miles of these two rivers and tributaries. The study included the hydraulic and hydrologic engineering talents of Corps engineers at the District, Division and Headquarters level, as well as the inter-nationally known Hydrologic Engineering Center in California. Independent technical review was carried out by experienced engineers in other Corps Districts and technical oversight and further review by another independent panel of experts from other Federal agencies and from academia.

However, even before the Corps work was completed and published, local university professors of geology and earth science challenged the study. Their simplified analysis and findings garnered much media and environmental attention by stating that the accepted Mississippi stage-frequency relationships published in 2004 are far too low. These individuals, none of whom are known to have a civil or hydraulic engineering background, have repeatedly challenged the Corps' findings based on their empirical research, which used only historic discharge and river stage information. They contend that the stage for the 100-year frequency should be several feet higher, based on their simplified methodology. Their method, specific gage analysis (SGA), examines the stage associated with a constant discharge throughout the historic period of record to ascertain trends in river stage and uses an indexing procedure to adjust historic stages to current levels. This paper overviews the Corps of Engineers Upper Mississippi River System Flow Frequency Study (UMRSFFS) which established the new flood profiles of the two rivers and will primarily concentrate on the St. Louis Gage, the longest record gage in the United States. It will also address the work of the local academics, point out several flaws inherent in their work and will serve to demonstrate the validity of the Upper Mississippi River System Flow Frequency Study completed by the Corps of Engineers.