Innovative Flood Hazard Information: Utilizing Multiple Lines of Evidence to Improve Flood Hazard Awareness and Resiliency

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Abstract

This presentation will highlight recent technological advances as well as innovative, yet feasible ways to provide critical flood hazard information needed by decision makers at the federal, state, and local levels. There are many commonly used and accepted methods for estimating flood hazards (flood frequency flows, elevations and floodplain widths) and each of the methods involve varying levels of effort and accuracy. In Texas, these methods have been shown to produce differences of more than 10 feet of depth for the 1% annual chance (100-yr) flood. The problem is that these estimates are regularly used to manage development and for emergency management purposes, and it is often the case that flood hazard is underestimated, negatively affecting the health and welfare of the public. People who locate themselves in and around bodies of water, generally are not aware of the variability of the information used to estimate flood hazard for their area.

Primary presentation topics include variability in flood flow frequency analysis estimates and shifting/transposition of observed storm events. The variability in flood flow frequency analysis estimates topic will show how estimates such as those developed using Bulletin 17C (England et. al) have the potential to change significantly as additional years/observations are added (Figure 1).

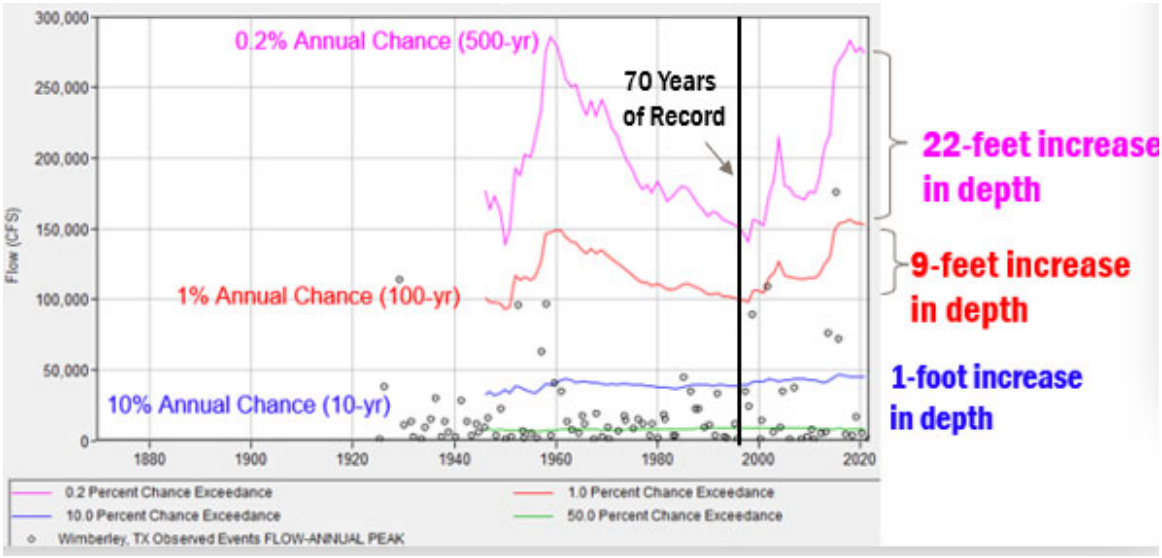

Figure 1. Example of how 100-yr (1% annual chance) flow estimate can change as additional years/observations are added to the B17C analysis

This topic will also highlight the new tool (Compute Using Expanding Window) within HEC-SSP 2.3 that is now available to show this variability. The storm shifting/transposition topic will illustrate how observed storm events, that narrowly missed an area, can be moved to get a more comprehensive picture of flood hazard potential for an area (Figure 2) and the new tool (Storm Transposition) within HEC-HMS 4.11 that is now available to simulate these scenarios (Figure 3).

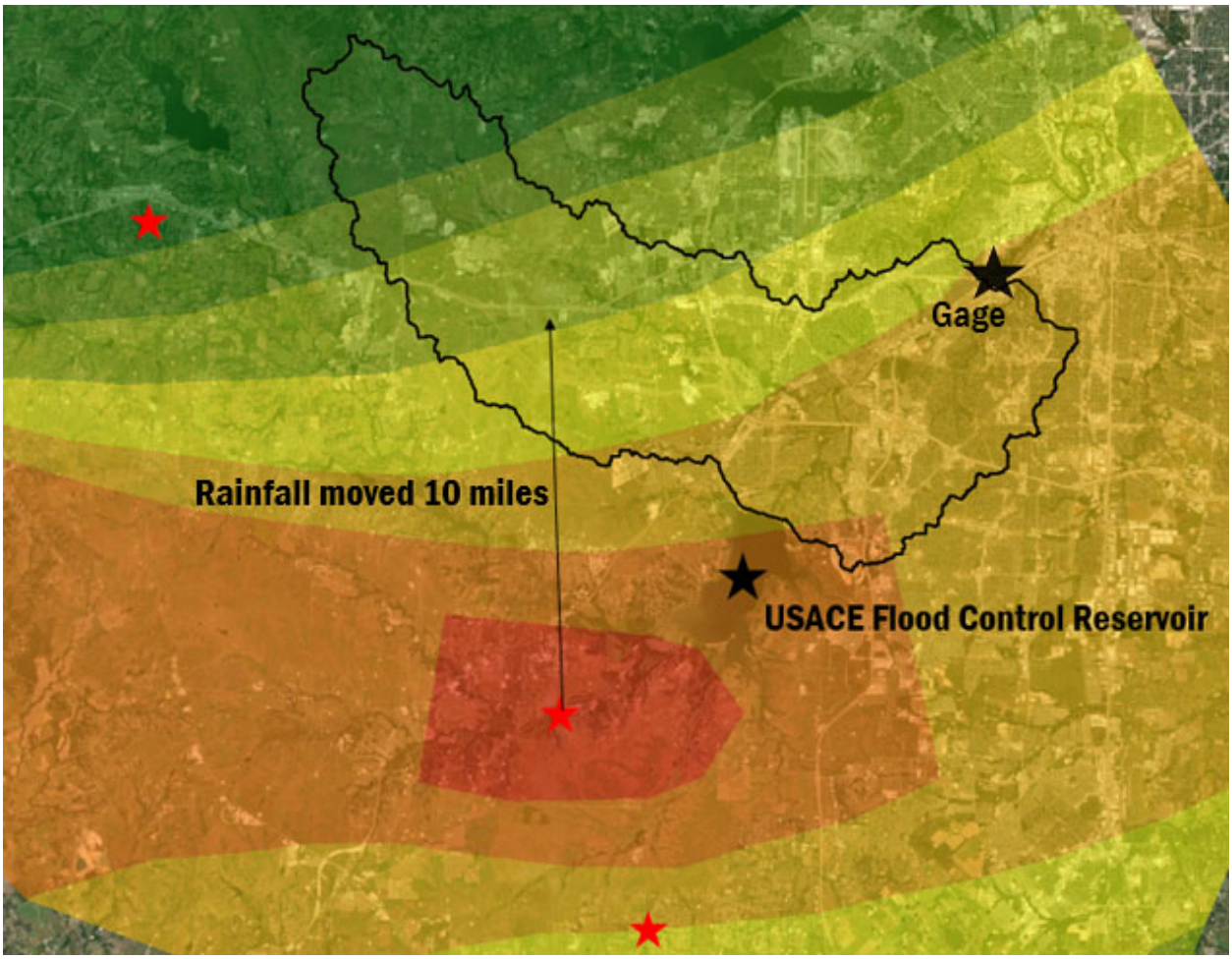

Figure 2. Example of how a regional storm that narrowly missed a watershed can be moved to improve flood hazard awareness and resiliency

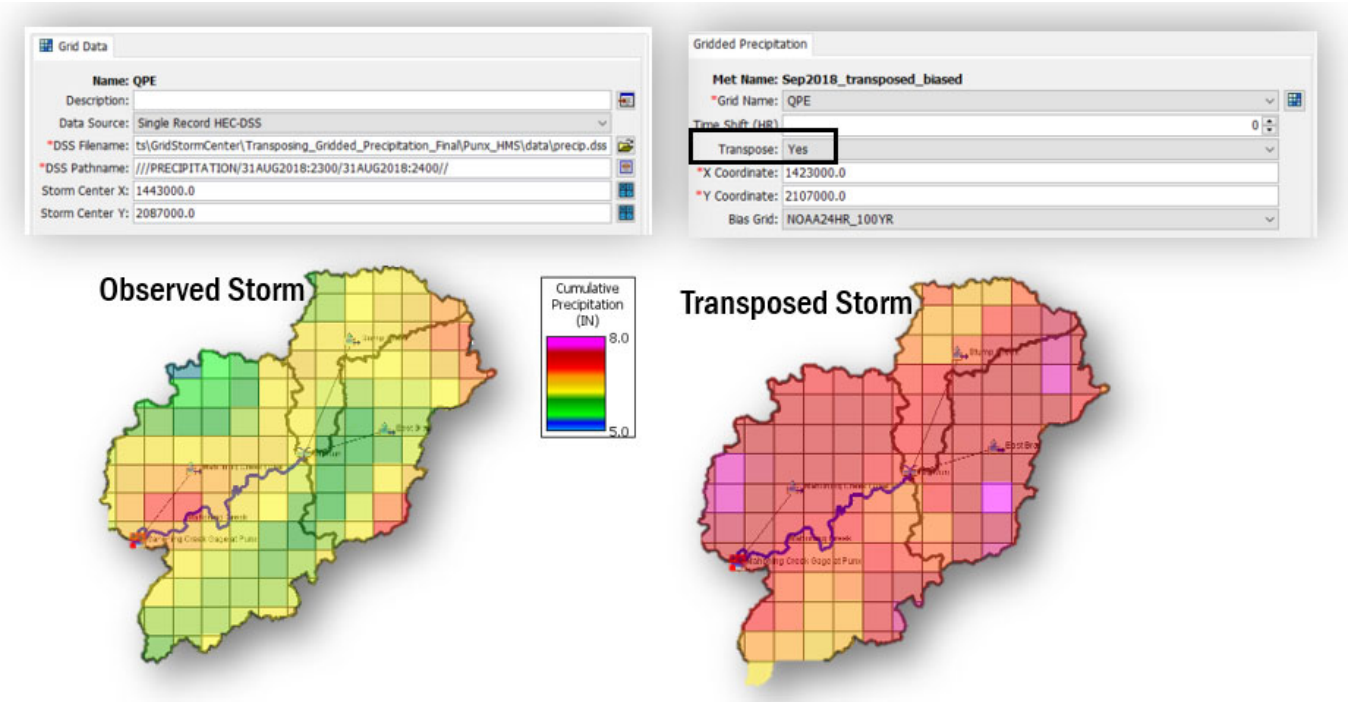

Figure 3. Screenshots from Storm Transposition tool now available in HEC-HMS 4.11

Flood hazard estimates produced by engineers have a direct and vital impact on the quality of life for all people. The Code of Ethics for Engineers requires engineers' “Hold paramount the safety, health, and welfare of the public.” It is the engineer's duty to utilize and communicate multiple lines of evidence surrounding final flood hazard estimates so decision makers can make more informed decisions about how to manage or reduce flood hazards. Utilizing innovative approaches such as observed storm shifting and the new HEC-SSP tool are positive steps towards improving flood hazard awareness and resiliency across the nation.

References

England,J.F.,Jr.,Cohn,T.A.,Faber,B.A.,Stedinger,J.R.,Thomas,W.O.,Jr.,Veilleux,A.G.,Kiang,J.E.,andMason,R.R.,Jr.,2018,Guidelinesfordeterminingfloodflowfrequency—Bulletin17C:U.S.GeologicalSurveyTechniquesandMethods,book4,chap.B5,148p.,https://doi.org/10.3133/tm4B5.