USACE-IWR-HEC Comments on:

"Flood-MAR Using Flood Water for Managed Aquifer Recharge to Support Sustainable Water Resources" White Paper - Discussion Draft, November 2017

General

The paper is well written and the goals expressed are worthy of pursuit. The description of the potential benefits and the complexity of achieving them is well described, as are some strategies for moving forward. However, there are three general topics that warrant additional attention and analysis: 1) the suitability of recharge areas; 2) the economics and relative costs of surface and groundwater delivery; and 3) the reduction of flood risk through the implementation of groundwater storage reservoirs.

Suitability of Recharge Areas

The paper touches upon the importance of soil type and depth of the water table in evaluating the effectiveness of potential recharge. The importance of regional hydrogeology should also be considered i.e. highly disparate benefits of aquifer recharge can be expected based on the location of Managed Aquifer Recharge (MAR) areas. The general hydrogeology of the Central Valley consists of mountain front and alluvial fan recharge areas that feeds water to deeper confined aquifers towards the valley center. The viability of infiltrating waters from farmlands reaching deeper aquifers that have been depleted by groundwater extraction should be considered when considering the potential benefits of aquifer recharge. Greater emphasis should be placed on the benefits of developing recharge basins in areas where water will eventually migrate to the deeper aquifers of the Central Valley.

Additionally, the willingness of the farmer and the potential for infiltrating waters to become contaminated (from fertilizers etc.) should be considered in a holistic approach. It appears that the perfect subset would consist of a willing farmer whose farm possesses highly permeable soils, and is located in an area where infiltrating waters have the potential to reach deeper, productive aquifers free from contamination. This subset would likely be fairly small.

Economics of Water Delivery

For supply reliability, it's not clear that flood agricultural fields would necessarily store water that could be readily recovered. Additionally, the cost of installation and extraction associated with pumping wells that are used to recover water that is stored in the subsurface was not addressed. Often, it is less expensive for farmer's to purchase surface water directly when compared to groundwater extraction costs. The economics involved in the recovery of recharged water should be more fully investigated.

Reduction of Flood Risk

A major goal of this project is to reduce flood risk with the benefit derived mainly from reducing peak flows. The paper lists both "skimming the peak" by diverting water from the channel during the highest flows, and also reducing reservoir storage in advance of an event to allow it more empty volume to manage releases (and diverting those advance releases.) The former method would require very good forecasting to allow waiting for the peak before diverting, because if the diversion is made too soon, the storage capacity of agricultural fields and recharge basins could be reached (and diversions ended) before the higher flows come. Reducing reservoir storage volume has more potential to be successful, but such releases can be made regardless of whether there are agricultural fields and recharge basins set to catch that water volume. Their ability to catch the water might make reservoir owners more willing to empty that volume, but it's not clear that they would receive any benefit, so that motivation would depend on the plan's established cooperation. By contrast, in the plan HEC explored in the past, the recharge of volume from the reservoir would be recharged in a location useful for later extraction by owners of the water i.e. recharge below the reservoir but upstream of use.