

ADWR Memo

To: Prescott AMA Groundwater Users Advisory Council

From: Keith Nelson, ADWR Hydrologist

Date: February 6th, 2015

Subject: Stream Monitoring Program in the Prescott AMA

The purpose of this memo is to provide justification for the establishment of a streamflow monitoring network along ephemeral tributaries in the Prescott Active Management Area (PrAMA). Data from the streamflow monitoring network will be used to provide more accurate estimates of natural recharge rate distributions. Natural recharge estimates can be used either as independent calibration targets, or be added as *a-priori* information (weighted) in the non-linear regression calibration process. Based on available data, the vast majority of tested PrAMA groundwater flow model explored during development consistently showed that most natural recharge occurs along major tributaries, including Granite Creek, Lynx Creek and losing reaches and tributaries of the Agua Fria River. The majority of tested ACM's indicate that approximately 2/3^{ds} of total natural recharge occurs along major tributaries (1939-2011); however the duration of most streamflow/recharge events along major tributaries is relatively short, and represents only about 10% of the total transient simulation period (1939-2011).

Although recharge is a relatively sensitive model parameter, acquiring additional seepage data will help refine estimates, and further improve our understanding of natural recharge distribution over space and time. Additionally, obtaining time-series streamflow data will allow us to better understand possible changes in streamflow/recharge patterns in the future due to urbanization, watershed changes and/or changes in reservoir management. Streamflow monitoring should be done in conjunction with groundwater level data measurements in wells located adjacent to known streamflow recharge areas. That is, groundwater recharge resulting in groundwater levels rises are correlated with stream transmission losses (recharge) along subject reaches.

Modeling results combined with an improved understanding of streamflow/recharge distribution in the PrAMA may provide opportunities for beneficial water management projects, including enhanced recharge. For example if data show there are areas where precipitation is lost to evaporation (either through evaporation; conveyance to impounds; areas with minimal recharge potential), opportunities may exist to re-direct runoff to location(s) more conducive to effective recharge to regional aquifers. Another example may include the developing of aquifer storage space in areas subject to subsequent stream recharge.

- **Improved understanding of natural recharge distribution (space and time) -> refined recharge estimates for regional water budget purposes**
- **Time-series streamflow data in combination with groundwater level data can be used to identify possible changes in streamflow/recharge patterns due to factors such as urbanization, watershed changes and/or changes in impound management**
- **Improved understanding of streamflow/recharge distribution patterns in the PrAMA may provide opportunities for beneficial water management projects, including enhanced recharge:**
 - **Redirect precipitation and/or runoff from precipitation, which would otherwise be lost to evaporation, towards locations more conducive to recharge**
 - **Induced recharge: Develop aquifer storage space in locations where data suggest stream recharge occurs (high streamflow transmission losses), possibly in conjunction with water exchanges; during "wet" periods this may have the added benefit of reducing downstream flood damage.**