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## MEMORANDUM

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**TO:** YSGA BOARD OF DIRECTORS

**FROM:** YSGA EXECUTIVE OFFICER

**SUBJECT:** WATER BUDGET

**DATE:** JUNE 15, 2018

**CC:** YSGA WORKING GROUP

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### **BACKGROUND**

A Water Budget considers the storage and movement of water between the four physical systems of the hydrologic cycle: atmospheric system, land surface system, river and stream system, and groundwater system. A Water Budget is a foundational tool used to account for the total groundwater and surface water entering, being stored, or leaving a basin (DWR HCM BMP, 2016). Additionally, water budget accounting assists water agencies in understanding individual water budget components necessary to support resource decision making.

### **GSP REGULATIONS**

DWR's Groundwater Sustainability Plan (GSP) Regulations require that the GSP include a tabular and graphical form of a Water Budget that provides an accounting and assessment of the total annual volume of groundwater and surface water entering and leaving the basin, including *historical*, *current*, and *projected* water budget conditions, and the change in the volume of water stored (GSP Regs §354.18(a)). The Water Budget shall quantify the following:

1. Total surface water entering and leaving a basin by water source type.
2. Inflow to the groundwater system by water source type, including subsurface inflow and infiltration of precipitation, applied water, and surface water systems.
3. Outflows from the groundwater system by water use sector, including evapotranspiration, groundwater extraction, groundwater discharge to surface water sources, and subsurface groundwater outflow.
4. The change in the annual volume of groundwater in storage between seasonal high conditions.
5. An estimate of sustainable yield for the basin.

### **YOLO SUBBASIN GSP PLANNING PROCESS**

The YSGA has chosen to work with the Stockholm Environment Institute (SEI) to develop the Yolo Subbasin Water Budget. SEI's Water Evaluation and Planning model (WEAP) is an excellent (and used by DWR) platform for developing the Water Budget since it is built on a basic principle of water balance accounting. All the processes in the hydrologic cycle can be simulated by WEAP, and as a database, WEAP provides a system for maintaining and updating water demand and supply information. The current model that has been modified for use in the Yolo Subbasin is an enhancement of a published Cache Creek model built by SEI with the YCFC&WCD in 2011.

With groundwater being a critical component of the Water Budget, it is necessary to simulate respective groundwater balances and their spatial impacts. WEAP on its own simply simulates an aquifer as an underground tank, and when coupled with MODFLOW it is enhanced to more accurately simulate the groundwater system. MODFLOW is the USGS modular finite-difference flow model that is widely used by hydrogeologists around the world to simulate the flow of groundwater through aquifers.

As part of this effort, SEI has culled as much data and information as possible and is currently reaching out to member agencies to obtain the missing details for comprehensively developing the Yolo Subbasin Water Budget. The water budget information will include the quantification of current, historical, and projected water budgets at the subbasin-level (potentially management area-levels); an estimate of sustainable yield; and description of inflows, outflows, and change in storage. The model will also be used to evaluate candidate sustainable management criteria and projects and management actions to assess measure performance for achieving basin-wide sustainability. The Water Budget will take into consideration projected changes in climate, land use, and population, and will be calculated into the future for 50 years under several projections.

**Cost Estimate:** \$443,452 (\$208,719 Proposition 1 Grants Funds/\$234,733 USDA Grant Funds)

**Schedule:** January – December 2018