KGA Member: Westside District Water Authority (WDWA)

1) Sustainability Goal:

The WDWA currently covers approximately 227,193 acres, or roughly 355 square miles of western Kern County, California. Of this total, approximately 88,989 acres (~140 square miles) is irrigated. Unique hydrogeologic characteristics of the WDWA that set it apart from the other water districts in the KCS are: **1**.) The WDWA is isolated from other groundwater basins and adjacent water districts along its entire western boundary by the Coastal Mountain Range. On the east and north, groundwater underflow towards the axis of the basin is impeded or slowed by a series of roughly north-south oriented geologic anticlines and synclines. **2**.) Groundwater is naturally degraded and of poor quality throughout most of the WDWA due to the presence of geologic sediments derived from marine environments, some of which contain saline connate water. These conditions make groundwater in the WDWA unsuitable for practical beneficial use. **3**.) Irrigation demand is met almost entirely by surface water delivered via the California Aqueduct. Groundwater is estimated to make up less than 2% of the water used for irrigation (~3,000 AFY) due to its poor quality. **4**.) The KGA C2VSim-Kern model (KGA Model) shows the most significant amount of discharge from the WDWA is in the form of subsurface groundwater outflow to the north, towards the former Tulare Lake bed, a beneficial use exception area, and eastward towards the axis of the Valley. The total volume of underflow is estimated to be approximately 111,000 AFY. Underflow out of the WDWA is the most significant contributor to modeled groundwater deficits in the WDWA. *Said another way, even if all pumping were to cease in the WDWA, using the KGA Model results, WDWA would still exhibit groundwater deficits due solely to the volume of underflow leaving the WDWA*. **5**.) Current conditions based on the KGA Model estimate total inflow (all sources) of ~92,300 AFY and discharges of ~138,540 AFY (110,934 AFY- underflow +27,556 AFY - pumping). The modeled deficit is ~46,200 AFY which is met by groundwater from storage entering the system. However, the current KGA Model grossly overestimates actual pumping volumes which if utilized would result in a deficit of ~22,000 AFY. It is important to note that this model is intended to be a Basin-wide assessment of groundwater conditions, is not specifically calibrated to the WDWA service area, and does not include accurate pumping estimates. Additional reconciliation of basin water budgeting efforts is a high priority for GMAs as part of GSP implementation. The base of freshwater and beneficial use in the WDWA is proposed as where groundwater quality exceeds 2,000 mg/L of TDS. With few exceptions, a significant area of the WDWA meets this exclusionary criterion.

2) Management Projects/Action Plans:

Groundwater quality in the WDWA is naturally degraded by elevated concentrations of TDS and other minerals that make it largely unsuitable for beneficial use without blending or treatment. Because of the demonstrated degraded quality of WDWA groundwater and the five hydrogeologic characteristics listed in #1, above, management projects/actions (PMAs) are focused on (1) coordinating with adjacent GMAs to collect representative hydrogeologic data to help refine future model simulations and monitor for identified Undesirable Results, and (2) assessing the potential to capture and reuse of a portion of the degraded groundwater underflow currently leaving the WDWA on an annual basis. The initial proposed PMAs are:

1. **Collect Representative Hydrogeologic Data**: Acquisition of representative groundwater data sufficient to assess and document short-term, seasonal, and long-term groundwater trends related to WDWA water budgets, groundwater pumping volumes, groundwater in storage, groundwater elevation, and potential future land subsidence. This PMA will be implemented beginning in the first five-year reassessment period.
2. **Water Resource Coordination**: The landowners and growers in the WDWA have historically made significant investment in efficient irrigation technologies and land management methods that promote water conservation and sustainability. The WDWA will work cooperatively and in close consultation with landowners, the KGA and adjacent GMAs to coordinate groundwater resource monitoring, testing, and future water trading and development to meet SGMA's sustainability goals over the implementation and planning horizon. This PMA will be implemented beginning in the first five-year reassessment period.
3. **Conjunctive Reuse of Brackish Groundwater**: To further enhance the sustainable and adaptive management strategies for WDWA, the WDWA is evaluating the feasibility of an innovative, phased project that will integrate the harvesting, treatment and conjunctive use of naturally degraded brackish groundwater underflow and the potential reuse of oilfield produced water for multiple beneficial uses. This PMA will be phased. The feasibility study will be completed during the first five-year reassessment period (by 2025). If determined to be viable, and State funding is available, the initial phase of facility construction and treated water production would be completed by 2030. A subsequent phase of facility construction to provide for increased treated water capacity would be completed between 2035 and 2040. The project objective is to produce approximately 50,000 AFY of treated water from a combination of oilfield produced water and brackish groundwater that is currently lost to the WDWA as underflow.

Because of the degraded nature of the groundwater quality in the WDWA, it has never been relied on as a primary source of water for irrigation. In the event that any or all of these PMAs cannot be achieved, the WDWA will rely on its long-time experience with water management to assist growers in implementing deficit irrigation, changes in cropping, and potential land fallowing and support and execute water transfers, exchanges and purchases.

3) Briefly Discuss -Checkbook/Management/Minimum Thresholds & Measurable Objectives:

Checkbook: The KGA Checkbook approach combines SWP water, a preliminary value of groundwater Native Yield, and a preliminary value of groundwater recharge from precipitation, to estimate the available water supply. It does not include groundwater underflow. The preliminary WDWA Native Yield for purposes of the Checkbook is 0.30 acre-foot per acre (af/ac) multiplied by all WDWA acreage. This results in a Native Yield volume of ~68,158 AFY. Note this multiplier is only used to estimate a Native Yield number and is not reflective of any allocation. Any potential future allocations will be addressed through a stakeholder process. Preliminary recharge from precipitation was estimated as 0.25 af/ac multiplied by the number of irrigated acres in the WDWA, which results in a volume of 22,247 AFY. Combined, these factors (0.30 + 0.25) result in a net value 0.55 af/ac for water available for irrigated acres in addition to that provided by the SWP and supplemental sources. The volume of SWP water includes Table "A" amounts (204,608 AFY), Article 21 amounts (660 AFY), and purchased supplemental imported water (76,000 AFY) that is delivered to WDWA via the California Aqueduct, although not all supplemental water is SWP. Together, this results in a total available surface water supply of 281,359 AFY versus a current condition demand estimated at ~285,000 AFY. The surface water supply was not adjusted for the preliminary 2030 and 2040 water budgets. Rather, if delivered volumes decrease over this time horizon it was assumed that management actions would be taken by the WDWA and its landowners and growers to reduce demand or increase supply.

Minimum Thresholds/Measurable Objectives: Of the six defined SGMA sustainability criteria, three elements apply to WDWA, and therefore require monitoring and/or MOs and MTs. They are; **1**) Chronic lowering of groundwater levels; **2**.) Reduction in groundwater storage; and **3**.) Potential for localized land subsidence. Fluctuations in groundwater levels and changes to groundwater in storage are linked in that, if sustainable groundwater level elevations are achieved, significant reductions in groundwater storage are avoided. There has been little historic reliance on groundwater for the purpose of irrigation or other uses in the WDWA, and the potential for a significant lowering of groundwater levels or reduction in storage due to pumping extractions is anticipated to be minimal.

C**hronic Lowering of Groundwater Levels/Reduction in Groundwater Storage**: According to the current and projected KGA Model results, the principal cause of groundwater deficit in the WDWA is underflow of ~111,000 AFY migrating north and east toward the axis of the Valley. The rate of brackish underflow migration leaving the WDWA is likely influenced by groundwater extractions within adjacent GMAs. MOs and MTs for groundwater elevations have been defined at four locations within the WDWA. These MOs and MTs are used as proxies to assess the potential for unsustainable reductions in groundwater storage due to groundwater underflow along the northern and eastern boundaries of the WDWA. The MOs and MTs also serve as an early-warning system for the potential migration of poor-quality groundwater into neighboring GMAs. The WDWA has proposed two sentry coordination zones with adjacent GMAs to monitor groundwater elevations and quality at the north and east boundaries of the WDWA in order to alert downgradient GMAs of potential Undesirable Results due to poor-quality underflow that may migrate into their GMAs. The respective MT/MOs for this element are informational, but will also be used to assess and refine modeled simulations of underflow volume and changes in ground water storage.

Land Subsidence: This condition will be monitored and reported by the WDWA in coordination with a KCS-wide subsidence monitoring plan administered by the KGA to ensure there are no undesirable effects to critical infrastructure. Changes in topographic surface elevations will be reported at a minimum every five years in the relevant GSP update report. The MT/MO for inelastic land subsidence will be established and reviewed in consultation with adjacent GMAs and will be based on future InSAR and land survey data. To the extent feasible the WDWA will coordinate the sharing of land subsidence data with DOGGR and local oil-producers that are party to the KGA Umbrella GSP.