

Report to TAC

Sustainability through Improvements in Irrigation Efficiency and Irrigation Water Management

February 9, 2026



Farm Assessments

- Farm Assessment to Assess Irrigation Efficiency
 - Farm Summary and Irrigated Fields
 - Water Supply – Surface and Groundwater
 - Water Distribution and Irrigation Equipment
- Statistics on outreach
 - 17 large irrigators in Sierra Valley in Plumas and Sierra Counties
 - 1 chose not to participate, 1 was minor, and 1 is pending
 - 14 Farm Assessment Reports developed for 16 Irrigators (88%) -
- Recommended Facilities
 - High Efficiency Sprinkler Packages, Sand Separators, Ditch Pump Intake Screens, Pump Variable Frequency Drives, Wheel Line Improvements, Pipelines, Soil Moisture Meters, and Weather Stations

Equipment Purchased and Installed

\$1 Million of Expenditures

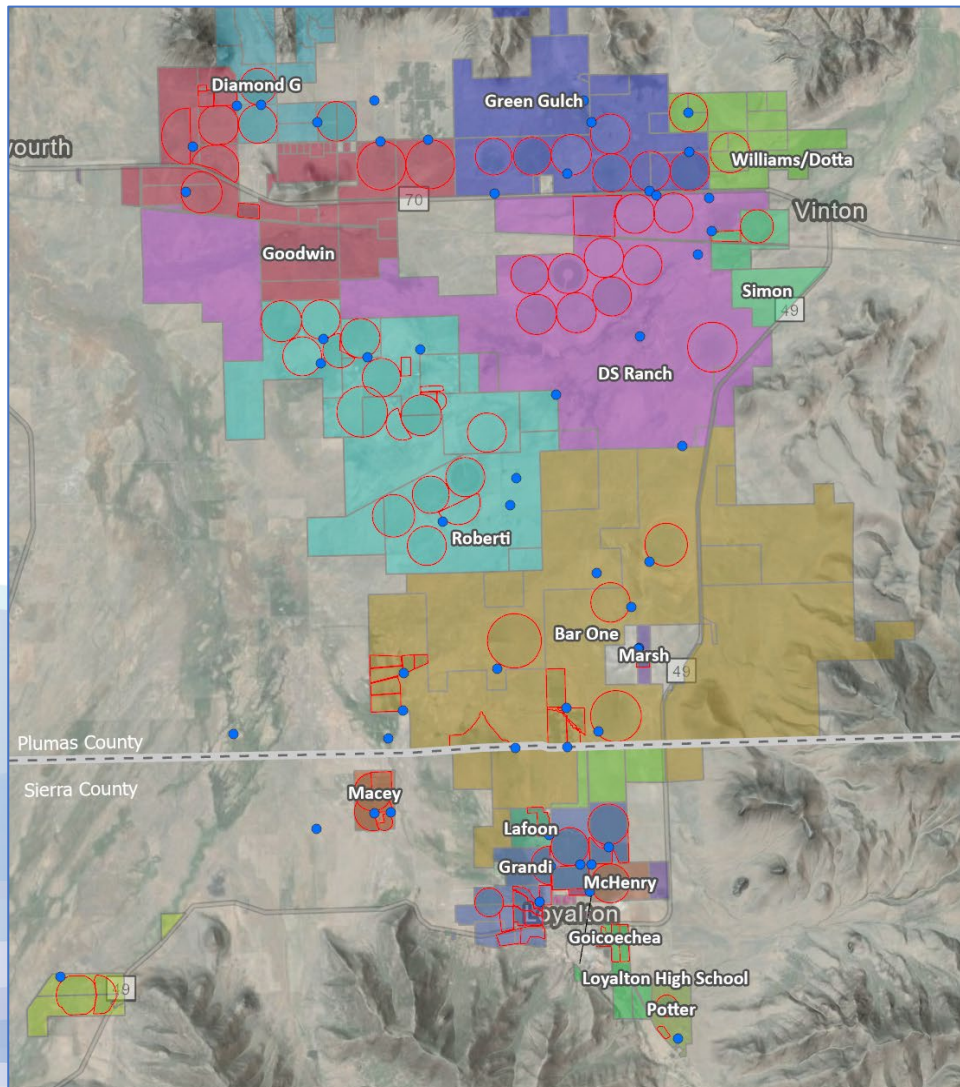
Facility	Number of Facilities		
	Recommended in Farm Assessment Reports	Number Installed to Date	Anticipated by Project Completion
High Efficiency Sprinkler Package (i.e. Low Elevation/large water drop)	49	40	40
Sand Separator	6	2	3
Ditch Pump Intake Screens	7	5	6
VFD	2	1	2
Wheel Line Improvements	37	17	17
Pipeline Construction	14	4	6
Soil Moisture Climatic Stations	38	11	13
	4	3	3

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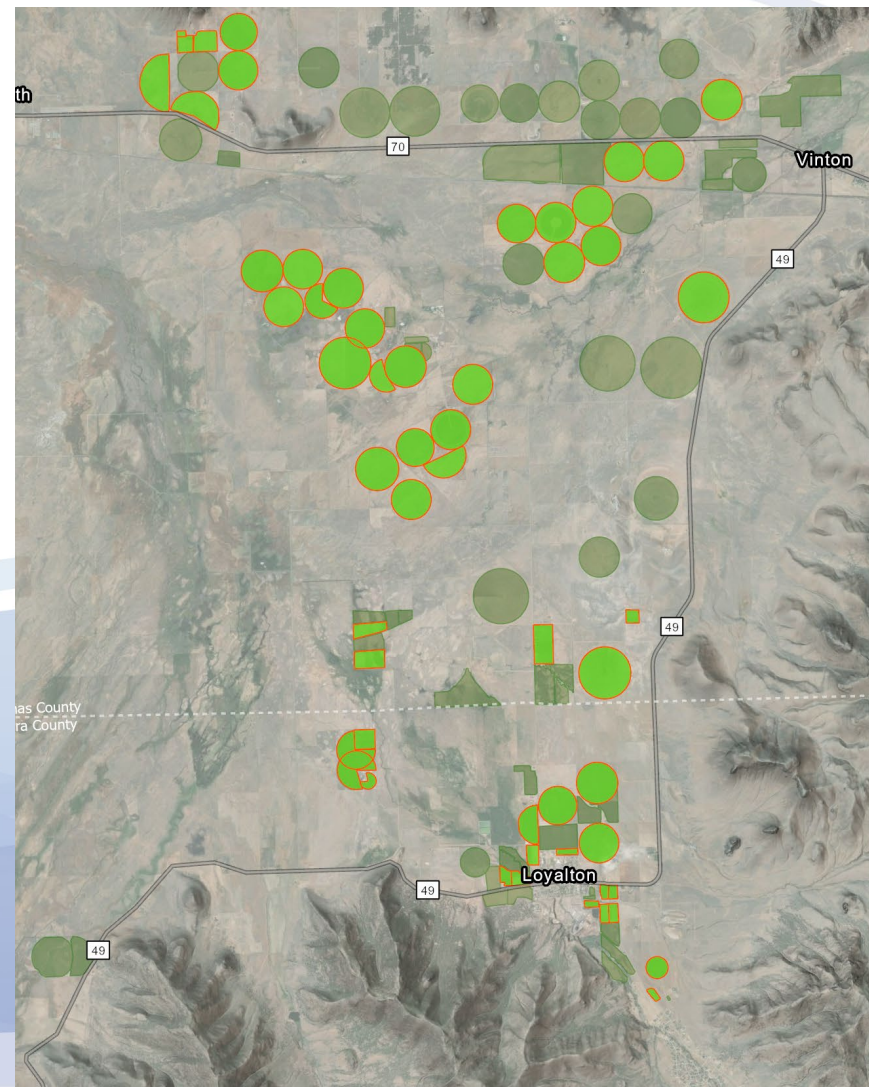


Targeted Large Irrigators for Assessments

Red Outlines indicate Groundwater Irrigated Fields targeted for Project Implementation



Highlighted Fields Indicate Locations of Irrigation Efficiency Project Improvements



Water Savings From Improved Equipment

- Improved Sustainability from Installed Equipment
 - Each new piece of equipment does not provide an absolute reduction in groundwater pumping since pumping varies by hydrologic condition and accessibility to multiple water sources. Furthermore, some new equipment may only support good irrigation water management practices, related to qualitative impacts below.
- Quantitative Savings
 - High efficiency sprinklers for Pivots, wheel line improvements, and new pipelines result in a groundwater pumping reduction of 400-465 AFY (preliminary estimate) during average hydrologic condition years.
- Qualitative Impacts
 - Sand Separators, Surface Intake Screens, VFDs, soil moisture sensors, and climate stations; improve irrigation distribution uniformity and advanced irrigation water management, that supports long-term irrigation efficiency and groundwater sustainability. (Unquantifiable)

Sierra Valley Demonstration Project

- Installed Sentek Soil Moisture Sensors
- Soil Profile Management/Modeling
- Basin Wide ET



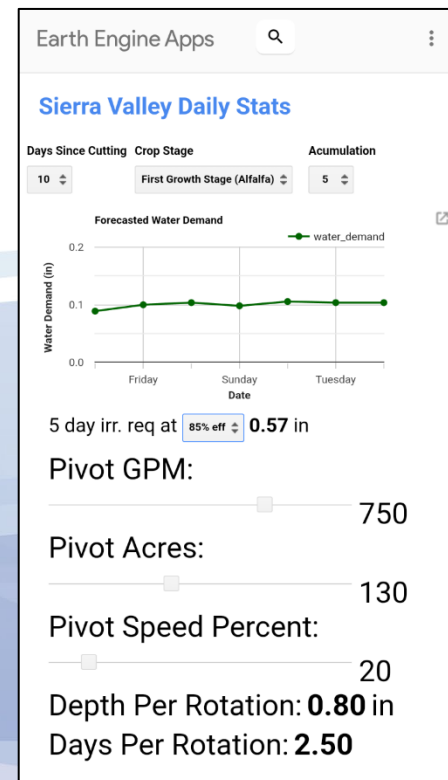
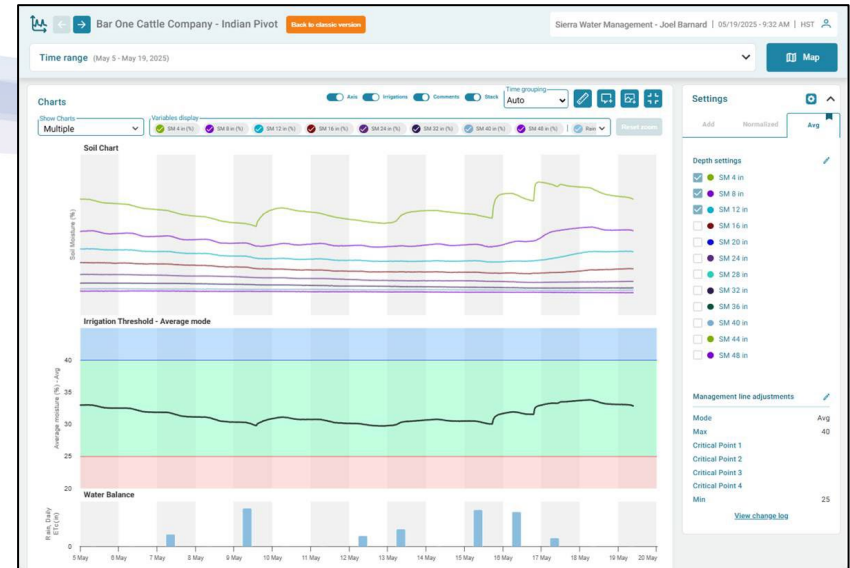
Installed Sentek Soil Moisture Meters

- Eight sites where soil moisture sensors installed
 - Collected soil moisture profile from 0 - 8 feet below soil surface
 - Soil moisture sensors were 8 feet long
- Soil properties were collected for laboratory testing
 - Composited by 1-ft depth increments
 - Lab analyses:
 - Organic matter
 - Particle size (sand/silt/clay)
 - USDA soil texture types



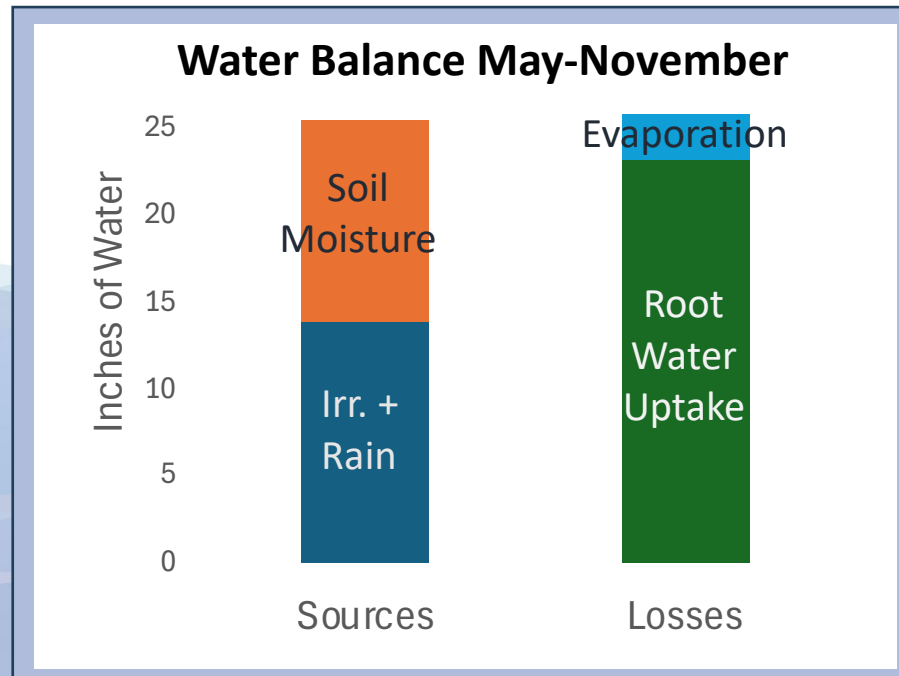
Soil Profile Management/Modeling

- AgSense 365 monitoring was focused on:
 - When to initiate irrigation
 - Prevent over irrigation and deep percolation in early growing season
 - End of season to ensure the soil profile could store upcoming winter precipitation
- Sierra Valley Irrigation Tool (<https://dri-apps.earthengine.app/view/sierra-valley-tool>)
 - Uses irrigator supplied information
 - Calculates near-future crop water needs and application rates



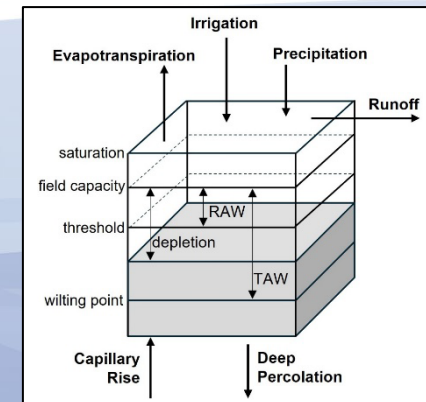
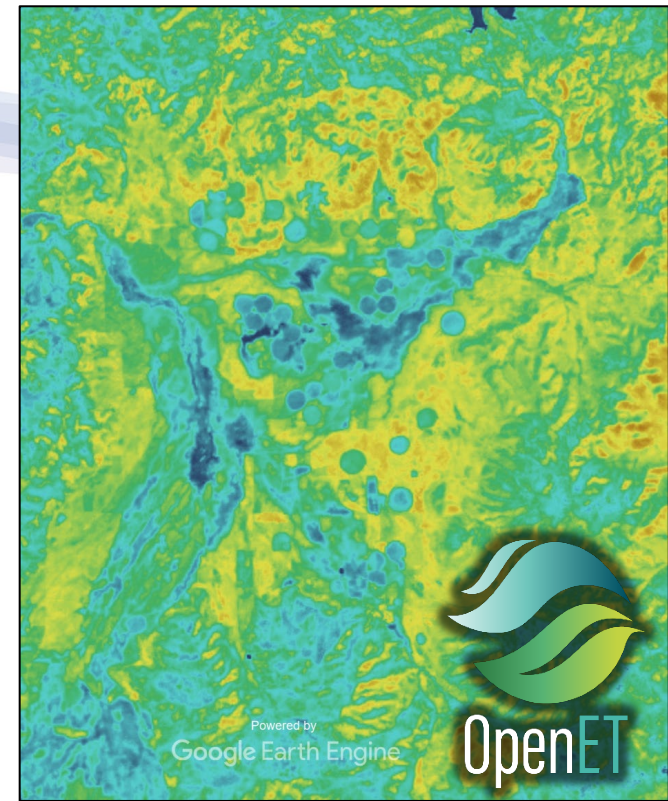
Analysis of Soil Moisture Data from 2025

- Very little drainage below root zone, usually associated with rain.
- Nearly half of ET came from soil moisture stored from wet season.
- Reasonable match with OpenET estimates of evapotranspiration.
- Unclear impacts of LESA vs. MESA (need better data on water applied at each location).



Remote Sensing - ET

- Agricultural ET
 - Data developed 1985-2025
 - OpenET Ensemble ET ranged from 95k-124k AFY from 2016-2020
 - Sierra Valley Hydrogeologic System Model (SVHSM) & Water Budget Report Total agriculture ET (Irrigated) for 2016-2020 (based on modeling):
 - Average: 78k AFY
 - Minimum: 68k AFY
 - Maximum: 89k AFY
- ET Demands
 - Model ran on the daily timestep (1985-2025)
 - Annually about 50% of precipitation is effective for agricultural fields. Rain/snow that isn't "effective" runs off or percolates into groundwater recharge
 - Precipitation during growing season (~20% of annual total) is nearly 100% effective.



Basin Irrigation Efficiency

- Upgraded pivots + pivots already high-efficiency
 - ~58 AF of groundwater saved in the demo project (2025)*
 - As much as 260 AF of groundwater could be saved basin-wide in a dry year (2021)*
- Upgrade all center pivots to higher-efficiency packages
 - ~154 AF of groundwater saved basin-wide (2025) *
 - As much as 710 AF of groundwater could be saved basin-wide in a dry year (2021)*
- In addition to savings from irrigation packages, there's savings from other on-farm improvements
- Majority of applied water in the valley is going to flood irrigation (Low efficiency)
 - Replenish groundwater
 - Support GDEs



(*Finalized numbers will be published in report)

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Summary and Recommendations

Opportunities for Continued Efficiency Improvements

- **Other Irrigation System Recommendations**

- Field irrigation system conversions (Wheel line to Center Pivots/Lateral Move Systems)
- Remaining pivot sprinkler conversions
- Laser level field – improve surface distribution uniformity
- Conveyance improvements – Ditch conversions/Rehab, pipelines

- **Irrigation Management Techniques** – Utilization of Forecasts and Observed Conditions to inform irrigation decisions

- On the ground Soil Moisture Sensors and Climate Data
- Forecasting Tools – weather and forecasted ET
- Soil Reservoir Monitoring and Management

Thank You

6/26/2024

