

# **ACTUAL EVAPOTRANSPIRATION ANALYSIS**

September 2023

Prepared for  
**East Kaweah Groundwater Sustainability Agency**

Prepared by  
 **LAND IQ**

2020 L Street, Ste 210  
Sacramento, CA  
Contact: Joel Kimmelshue  
916.265.6330

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## SUMMARY

**TABLE 1. SUMMARY OF GSA ET AND PRECIPITATION (117,346 AC)**

	ET (ac-ft)	Precipitation (ac-ft)
<b>2023 Allocation Year to date (OCT 1, 2022 - SEP 30, 2023)</b>	261,015	193,051
<b>2022 Allocation Year to date (OCT 1, 2021 - Sep 30, 2022)</b>	257,412	84,548
<b>Allocation Year 2022 (OCT 1, 2021 - SEP 30, 2022)</b>	257,412	84,548
<b>Allocation Year 2021 (OCT 1, 2020 - SEP 30, 2021)</b>	256,327	45,974

**TABLE 2. SENSORS USED IN DAILY AND MONTHLY ET<sub>A</sub> ANALYSIS BY CROP CATEGORY**

	Number of Active Stations	Number of Used Stations in model
<b>Alfalfa</b>	8	7
<b>Almonds</b>	18	17
<b>Annual</b>	3	3
<b>Citrus</b>	14	13
<b>Fallow/Native</b>	8	7
<b>Grapes</b>	9	9
<b>Olives</b>	0	0
<b>Pistachios</b>	13	13
<b>Pomegranates</b>	1	1
<b>Walnuts</b>	2	2

**TABLE 3. PRECIPITATION MEASURED BY FIELD STATIONS**

Station ID	Source	September Precipitation (in)	Year to Date (Oct 1, 2022 - Sep 30, 2023)
<b>CIMIS #205: Coalinga</b>	CIMIS	0	10.46
<b>CIMIS #5: Shafter</b>	CIMIS	0	11.6
<b>CIMIS #15: Stratford</b>	CIMIS	0.03	10.77
<b>CIMIS #2: FivePoints</b>	CIMIS	0	10.47
<b>CIMIS #146: Belridge</b>	CIMIS	0.02	12.39
<b>CIMIS #39: Parlier</b>	CIMIS	0.03	10.28
<b>CIMIS #105: Westlands</b>	CIMIS	0	2.07
<b>CIMIS #80: Fresno State</b>	CIMIS	0.01	10.85
<b>CIMIS #182: Delano</b>	CIMIS	0	14.26
<b>CIMIS #125: Arvin_Edison</b>	CIMIS	0	12.72
<b>CIMIS #148: Merced</b>	CIMIS	0.01	0.01
<b>CIMIS #206: Denair II</b>	CIMIS	0.05	7.04
<b>USC00044957</b>	GHCN	0	0.46
<b>LandIQ_GK_Full_Murcotts</b>	Land IQ	0.06	20.62

CIMIS - California Irrigation Management Information System; CNRFC - California Nevada River Forecast Center; GHCN - Global Historical Climate Network.

## REMOTE SENSING RESULTS

TABLE 4. IMAGE DATES AND SOURCES

Date	Image Source
9/5/2023	Landsat-8
9/8/2023	Sentinel-2
9/13/2023	Landsat-9
9/14/2023	Sentinel-2
9/21/2023	Landsat-8
9/23/2023	Sentinel-2
9/28/2023	Sentinel-2
9/29/2023	Landsat-9

TABLE 5. MONTHLY GSA ET<sub>A</sub>

Unit	OCT, 2022	NOV, 2022	DEC, 2022	JAN, 2023	FEB, 2023	MAR, 2023	APR, 2023	MAY, 2023	JUN, 2023	JUL, 2023	AUG, 2023	SEP, 2023
(mm)	40.9	19.8	11.5	21.2	30.8	51.9	70.1	106.0	90.9	83.1	86.0	67.3
(inch)	1.6	0.8	0.5	0.8	1.2	2.0	2.8	4.2	3.6	3.3	3.4	2.6
(AF)	15,727	7,632	4,427	8,149	11,856	19,967	26,988	40,812	35,009	32,001	33,091	25,924

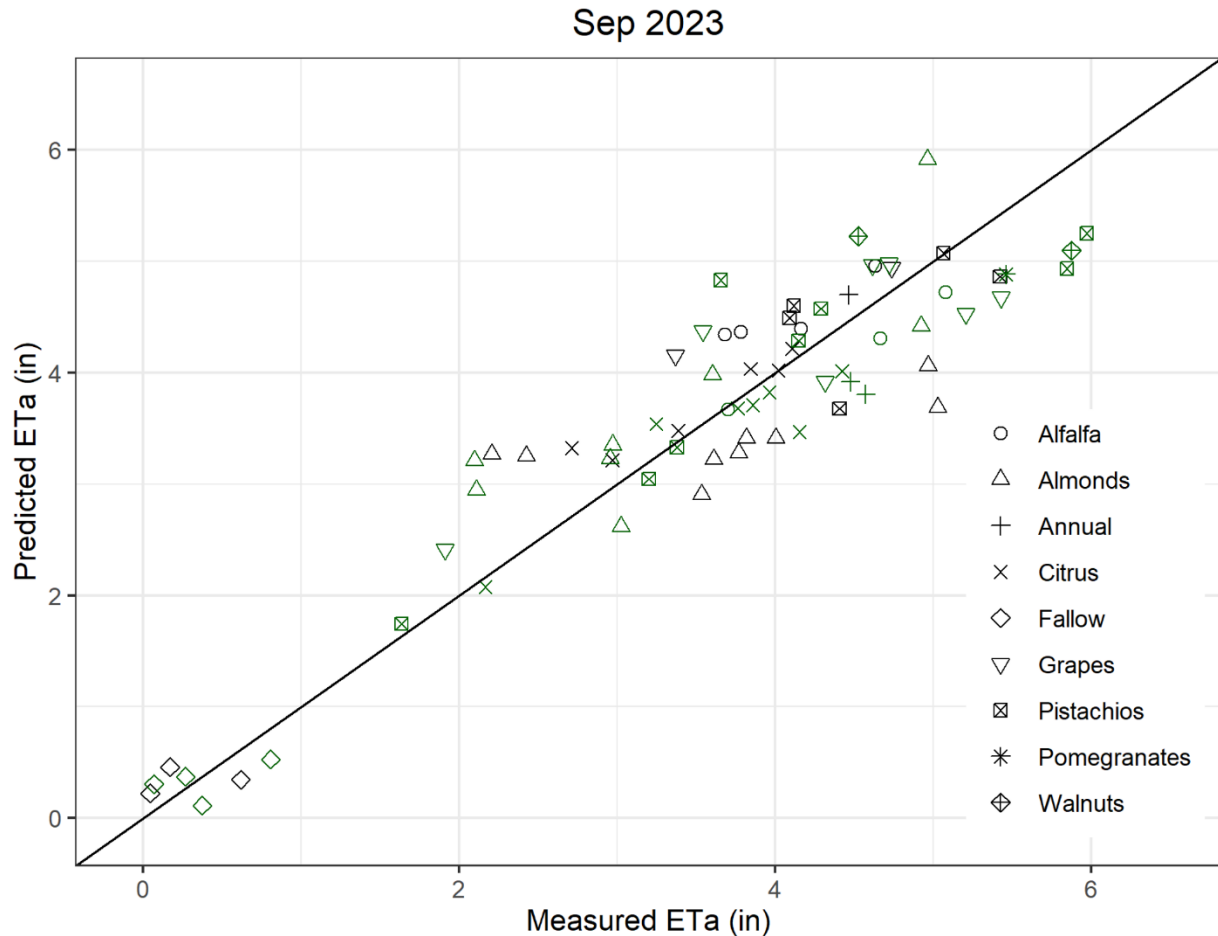
TABLE 6. MONTHLY FIELD ET<sub>A</sub>

ET <sub>A</sub> (in) Including Fallow													
	Field Size (ac)	OCT, 2022	NOV, 2022	DEC, 2022	JAN, 2023	FEB, 2023	MAR, 2023	APR, 2023	MAY, 2023	JUN, 2023	JUL, 2023	AUG, 2023	SEP, 2023
Maximum	230.1	3.3	1.6	0.8	1.4	1.9	3.1	5.1	7.2	7.4	8.5	7.2	5.4
Minimum	0.04	0.0	0.0	0.2	0.1	0.4	0.0	0.0	0.2	0.0	0.0	0.0	0.0
Average	10.1	1.9	0.9	0.5	0.9	1.2	2.0	2.5	4.3	3.7	3.1	3.6	2.7
ET <sub>A</sub> (in) Excluding Fallow													
	Field Size (ac)	OCT, 2022	NOV, 2022	DEC, 2022	JAN, 2023	FEB, 2023	MAR, 2023	APR, 2023	MAY, 2023	JUN, 2023	JUL, 2023	AUG, 2023	SEP, 2023
Maximum	230.1	3.3	1.6	0.8	1.4	1.9	3.1	5.1	7.2	7.4	8.5	7.2	5.4
Minimum	0.04	0.0	0.0	0.2	0.1	0.4	0.0	0.1	0.2	0.0	0.0	0.0	0.0
Average	10.3	2.1	1.0	0.5	0.9	1.2	2.0	2.6	4.4	4.0	3.3	3.9	2.9

TABLE 7. MONTHLY GSA PRECIPITATION

Precipitation Unit	OCT, 2022	NOV, 2022	DEC, 2022	JAN, 2023	FEB, 2023	MAR, 2023	APR, 2023	MAY, 2023	JUN, 2023	JUL, 2023	AUG, 2023	SEP, 2023
(mm)	0.0	19.8	97.7	113.6	87.4	157.1	0.5	2.9	2.3	0.0	19.4	0.6
(inch)	0.0	0.8	3.8	4.5	3.4	6.2	0.0	0.1	0.1	0.0	0.8	0.0
(AF)	0	7,628	37,624	43,744	33,651	60,464	176	1,110	877	0	7,463	246

## ACCURACY OF REMOTE SENSING RESULTS



**FIGURE 1. MEASURED VERSUS PREDICTED ET<sub>A</sub> FOR THE MONTH. SYMBOL COLORS REPRESENT THE STATION TYPES (BLACK = FULL, GREEN = WATER IQ (WIQ))**

**TABLE 8. MEASURED VS. PREDICTED MONTHLY ET<sub>A</sub>**

R <sup>2</sup>	RMSE (IN)
0.85	0.55

Note: The R<sup>2</sup> value is the relative measure of fit of the observed data to the predicted result, where a value of 1 indicates a perfect fit. RMSE can be interpreted as the standard deviation, where a value of 0 indicates a perfect fit to the observed data.