

# **ACTUAL EVAPOTRANSPIRATION ANALYSIS**

December 2023

Prepared for  
**East Kaweah Groundwater Sustainability Agency**



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

**JANUARY 31, 2024**

## SUMMARY

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

	ET (ac-ft)	Precipitation (ac-ft)
<b>2024 Allocation Year to date (OCT 1, 2023 - DEC 31, 2023)</b>	30,585	14,211
<b>2023 Allocation Year to date (OCT 1, 2022 - Dec 31, 2022)</b>	27,662	45,279
<b>2022 Allocation Year to date (OCT 1, 2021 - Dec 31, 2021)</b>	29,064	64,067
<b>Allocation Year 2023 (OCT 1, 2022 - SEP 30, 2023)</b>	261,015	193,045
<b>Allocation Year 2022 (OCT 1, 2021 - SEP 30, 2022)</b>	257,412	84,548

**TABLE 2. SENSORS USED IN DAILY AND MONTHLY ETA ANALYSIS BY CROP CATEGORY**

	Number of Active Stations	Number of Used Stations in model
<b>Alfalfa</b>	9	9
<b>Almonds</b>	18	13
<b>Annual</b>	2	2
<b>Citrus</b>	16	10
<b>Fallow/Native</b>	10	6
<b>Grapes</b>	9	7
<b>Olives</b>	1	0
<b>Pistachios</b>	12	9
<b>Pomegranates</b>	1	1
<b>Walnuts</b>	2	2

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

Station ID	Source	December Precipitation (in)	Year to Date (Oct 1, 2023 - Dec 31, 2023)
<b>CIMIS #205: Coalinga</b>	CIMIS	1.48	1.63
<b>CIMIS #5: Shafter</b>	CIMIS	0.75	1
<b>CIMIS #15: Stratford</b>	CIMIS	0.94	1.17
<b>CIMIS #2: FivePoints</b>	CIMIS	1.75	1.75
<b>CIMIS #146: Belridge</b>	CIMIS	1.78	2
<b>CIMIS #39: Parlier</b>	CIMIS	0.96	1.14
<b>CIMIS #7: Firebaugh</b>	CIMIS	2.16	2.08
<b>CIMIS #148: Merced</b>	CIMIS	1.88	2.44
<b>CIMIS #206: Denair II</b>	CIMIS	1.79	2.67
<b>LandIQ_GK_Full_Murcotts</b>	Land IQ	1.26	1.63
<b>LandIQ_EK_Full_Sumos_2023</b>	Land IQ	0.93	1.09
<b>LandIQ_EK_Full_Olives_2023</b>	Land IQ	1.3	1.22

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
12/12/2023	Sentinel 2A

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

Unit	OCT, 2023	NOV, 2023	DEC, 2023	JAN, 2024	FEB, 2024	MAR, 2024	APR, 2024	MAY, 2024	JUN, 2024	JUL, 2024	AUG, 2024	SEP, 2024	Total
(mm)	46.2	20.3	13.2										79.7
(inch)	1.8	0.8	0.5										3.1
(AF)	17,795	7,801	5,094										30,690

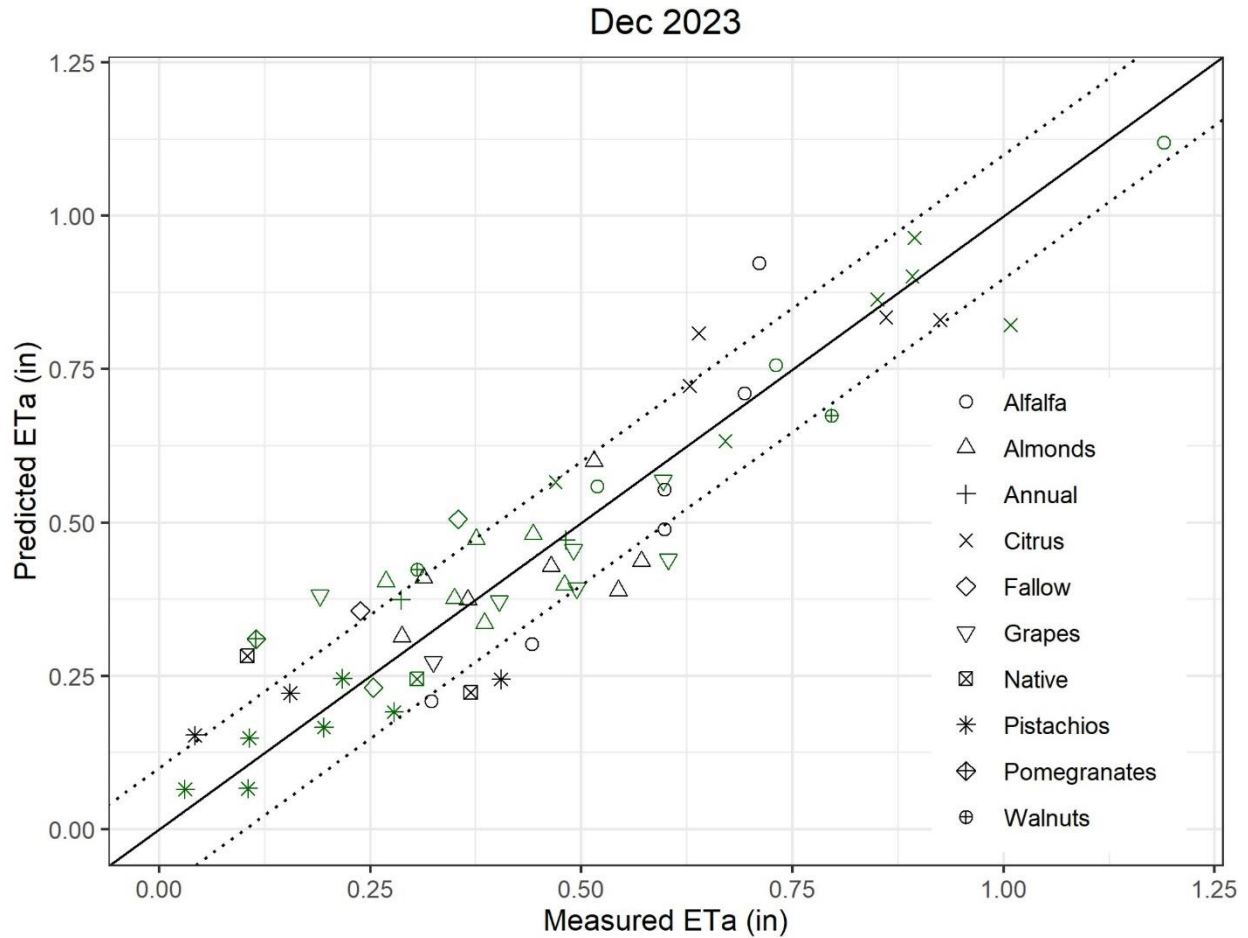
TABLE 6. MONTHLY FIELD ET<sub>A</sub>

ET <sub>a</sub> (in) Including Fallow														
	Field Size (ac)	OCT, 2023	NOV, 2023	DEC, 2023	JAN, 2024	FEB, 2024	MAR, 2024	APR, 2024	MAY, 2024	JUN, 2024	JUL, 2024	AUG, 2024	SEP, 2024	Ave
Maximum	230.1	3.6	1.9	1.1										3.9
Minimum	0.04	0.0	0.0	0.0										0.0
Average	10.1	1.9	0.9	0.6										2.0
ET <sub>a</sub> (in) Excluding Fallow														
	Field Size (ac)	OCT, 2023	NOV, 2023	DEC, 2023	JAN, 2024	FEB, 2024	MAR, 2024	APR, 2024	MAY, 2024	JUN, 2024	JUL, 2024	AUG, 2024	SEP, 2024	Ave
Maximum	230.1	3.6	1.5	1.1										3.7
Minimum	0.04	0.0	0.0	0.0										0.0
Average	10.3	2.1	1.0	0.6										2.2

TABLE 7. MONTHLY GSA PRECIPITATION

Precipitation Unit	OCT, 2023	NOV, 2023	DEC, 2023	JAN, 2024	FEB, 2024	MAR, 2024	APR, 2024	MAY, 2024	JUN, 2024	JUL, 2024	AUG, 2024	SEP, 2024	Total
(mm)	2.8	6.4	27.7										36.9
(inch)	0.1	0.3	1.1										1.5
(AF)	1,076	2,474	10,657										14,206

## 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)). THE SOLID LINE REPRESENTS 1:1 LINE, WHILE THE DOTTED LINE ARE THE 1:1 LINE PLUS AND MINUS THE RMSE (ROOT MEAN SQUARE ERROR).**

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

R <sup>2</sup>	RMSE (IN)
0.84	0.10

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.