

HYDROLOGIC DATA BRIEF FOR THE EDWARDS AQUIFER THROUGH JUNE 2017

Prepared by

David L. Gregory

Ron Gloyd

Geary Schindel, P.G.

Edwards Aquifer Authority

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UVALDE COUNTY RAINFALL (in inches) for 2017

	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sept.	Oct.	Nov.	Dec.
Monthly Rainfall (2017)	0.80	1.58	1.92	2.67	3.70	0.77						
1981-2010 Climate Normals	1.18	1.25	1.76	1.71	3.03	2.97	2.79	1.81	2.59	2.88	1.54	1.09
Difference	-0.38	0.33	0.16	0.96	0.67	-2.20						

30-year Normal Average	24.60
Total for January - June 2017	11.44
30-year Normal Average January - June 2017	11.90
Total Difference for Year to Date	-0.46
Percent of 30-year Normal Average Year to Date	96%

Rainfall Data provided by National Weather Service (NWS) rainfall station located at Garner Field Airport.

MEDINA COUNTY RAINFALL (in inches) for 2017

	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sept.	Oct.	Nov.	Dec.
Monthly Rainfall (2017)	0.41	1.31	1.78	2.71	2.81	1.94						
1981-2010 Climate Normals	1.38	1.49	2.13	1.98	3.38	3.49	2.09	1.67	2.60	3.31	1.58	1.14
Difference	-0.97	-0.18	-0.35	0.73	-0.57	-1.55						

30-year Normal Average	26.24
Total for January - June 2017	10.96
30-year Normal Average January - June 2017	13.85
Total Difference for Year to Date	-2.89
Percent of 30-year Normal Average Year to Date	79%

Rainfall Data provided by NWS rainfall station located at Hondo Municipal Airport.

1981-2010 Climate Normals are NCDC's latest three-decade averages of climatological variables, including temperature and precipitation.

This new product replaces the 1971-2000 Climate Normals product, which remains available as historical data.

SOURCE: <https://www.ncdc.noaa.gov/cdo-web/datatools/normals>

BEXAR COUNTY RAINFALL (in inches) for 2017

	Jan.	Feb.	Mar.	Apr.	May.	Jun.	Jul.	Aug.	Sept.	Oct.	Nov.	Dec.
Monthly Rainfall (2017)	2.72	3.61	2.09	2.89	1.76	0.40						
1981-2010 Climate Normals	1.76	1.79	2.31	2.10	4.01	4.14	2.74	2.09	3.03	4.11	2.28	1.91
Difference	0.96	1.82	-0.22	0.79	-2.25	-3.74						

30-year Normal Average	32.27
Total for January - June 2017	13.47
30-year Normal Average January - June 2017	16.11
Total Difference for Year to Date	-2.64
Percent of 30-year Normal Average Year to Date	84%

Rainfall Data provided by NWS rainfall station located at San Antonio International Airport.

COMAL COUNTY RAINFALL (in inches) for 2017

	Jan.	Feb.	Mar.	Apr.	May.	Jun.	Jul.	Aug.	Sept.	Oct.	Nov.	Dec.
Monthly Rainfall (2017)	2.78	2.33	3.30	4.40	2.50	1.98						
1981-2010 Climate Normals	1.86	2.02	2.66	2.28	3.97	4.78	2.62	1.95	3.09	4.25	2.87	2.27
Difference	0.92	0.31	0.64	2.12	-1.47	-2.80						

30-year Normal Average	34.62
Total for January - June 2017	17.29
30-year Normal Average January - June 2017	17.57
Total Difference for Year to Date	-0.28
Percent of 30-year Normal Average Year to Date	98%

Rainfall Data provided by NWS rainfall station located at New Braunfels Municipal Airport.

1981-2010 Climate Normals are NCDC's latest three-decade averages of climatological variables, including temperature and precipitation. This new product replaces the 1971-2000 Climate Normals product, which remains available as historical data.

SOURCE: <https://www.ncdc.noaa.gov/cdo-web/datatools/normals>

HAYS COUNTY RAINFALL (in inches) for 2017

	Jan.	Feb.	Mar.	Apr.	May.	Jun.	Jul.	Aug.	Sept.	Oct.	Nov.	Dec.
Monthly Rainfall (2017)	2.46	2.66	3.04	6.54	2.20	0.99						
1981-2010 Climate Normals	2.06	1.92	2.48	2.72	4.13	4.64	2.5	2.19	3.42	4.33	3.05	2.29
Difference	0.40	0.74	0.56	3.82	-1.93	-3.65						

30-year Normal Average	35.73
Total for January - June 2017	17.89
30-year Normal Average January - June 2017	17.95
Total Difference for Year to Date	-0.06
Percent of 30-year Normal Average Year to Date	100%

Rainfall Data provided by NWS rainfall station located in San Marcos.

Rainfall Data provided by EAA Gauge HA158 located about 0.25 miles west of Bobcat Stadium.
NWS Rainfall Station at San Marcos Airport-out of service

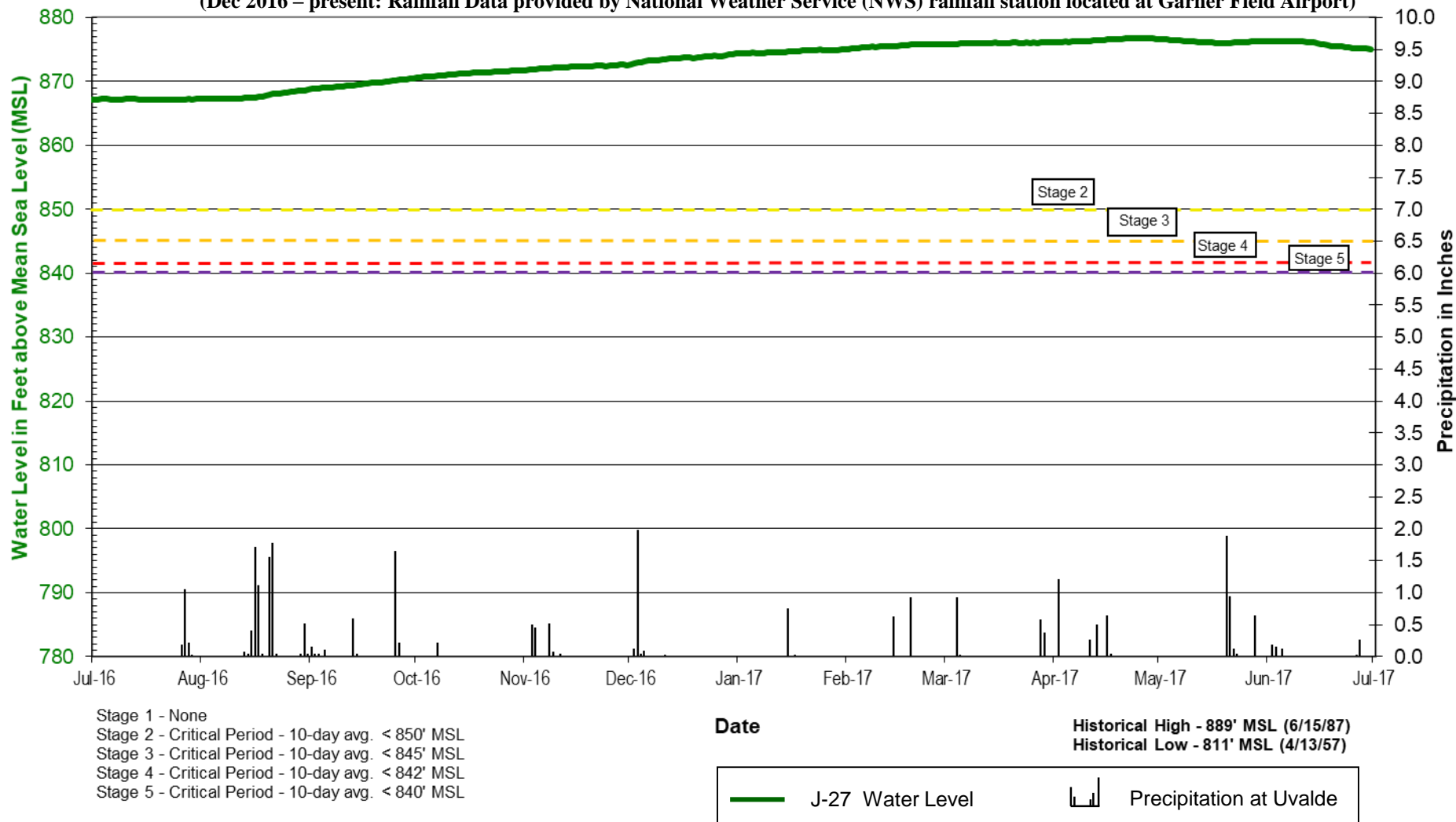
June 4, 2017: HA157 data substituted for HA158 due to technical issues at HA158

1981-2010 Climate Normals are NCDC's latest three-decade averages of climatological variables, including temperature and precipitation. This new product replaces the 1971-2000 Climate Normals product, which remains available as historical data.
SOURCE: <https://www.ncdc.noaa.gov/cdo-web/datatools/normals>

Hydrograph of the Uvalde County Index Well (J-27) and Precipitation at Uvalde

(Feb – Nov 2016: Rainfall Data provided by EAA Rain Gauge UV033 located 4.4 miles south of the City of Uvalde)

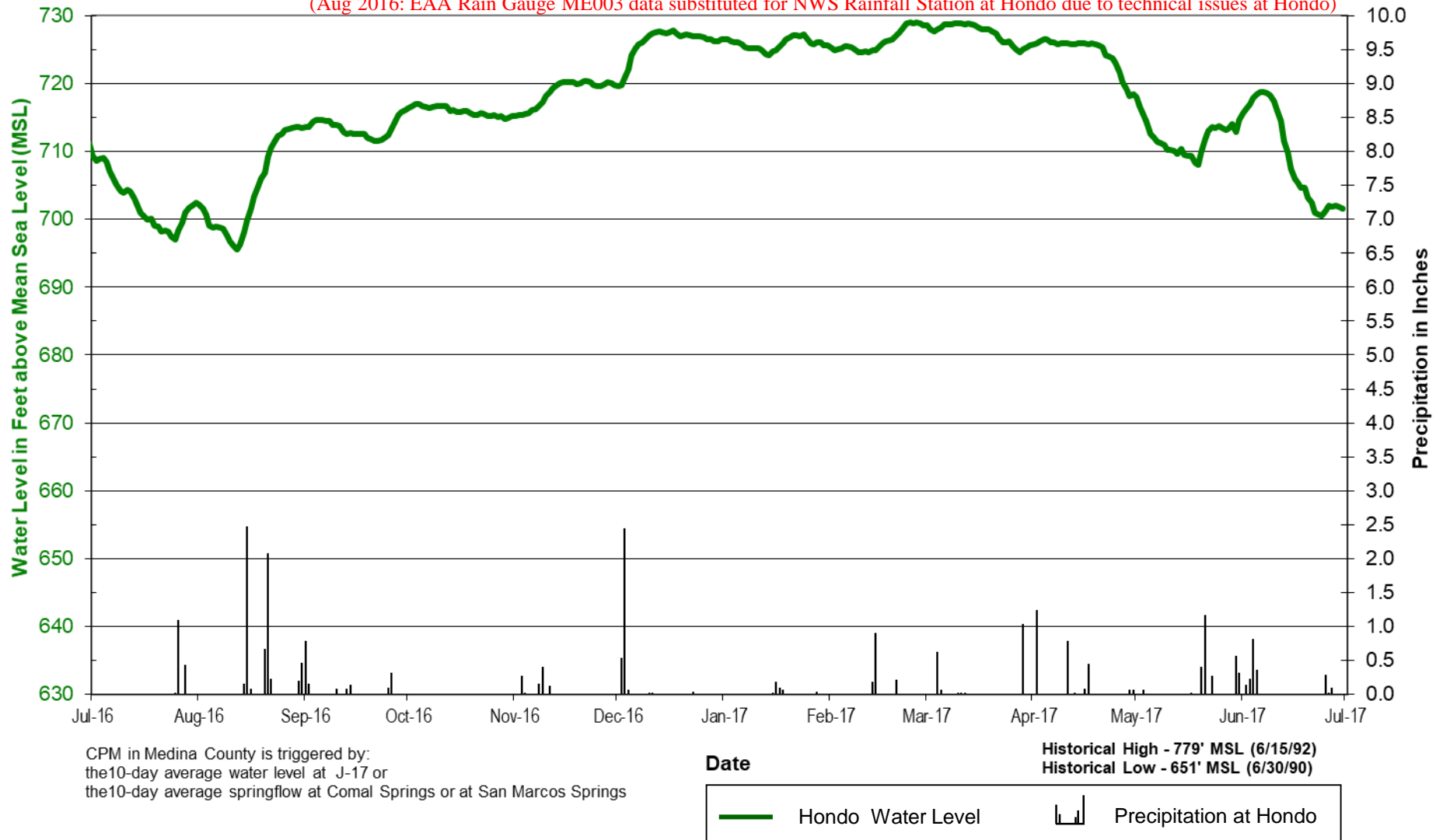
(Dec 2016 – present: Rainfall Data provided by National Weather Service (NWS) rainfall station located at Garner Field Airport)



Hydrograph of the Medina County Hondo City Well and Precipitation at Hondo

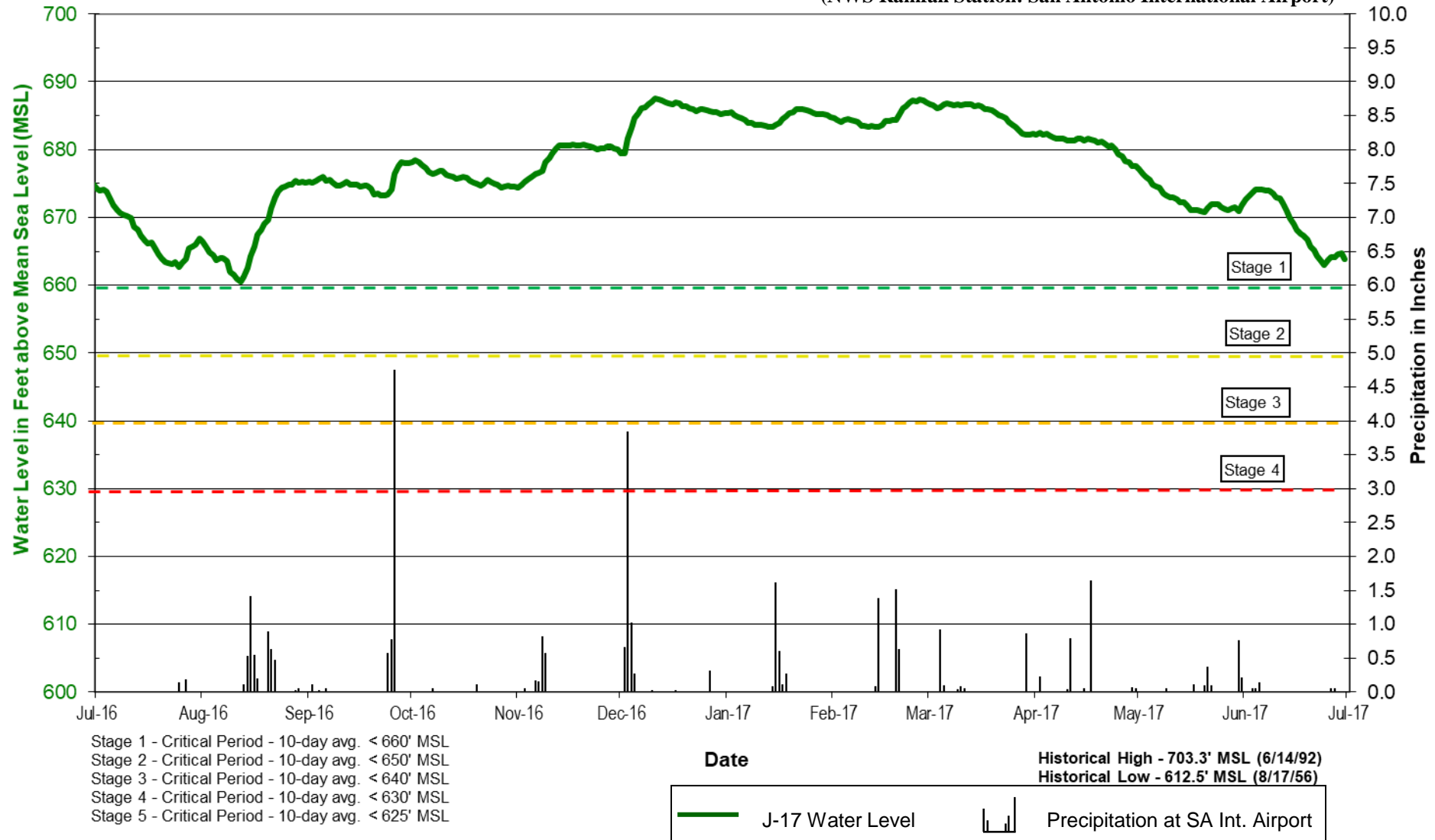
(NWS Rainfall Station: Hondo Municipal Airport)

(Aug 2016: EAA Rain Gauge ME003 data substituted for NWS Rainfall Station at Hondo due to technical issues at Hondo)



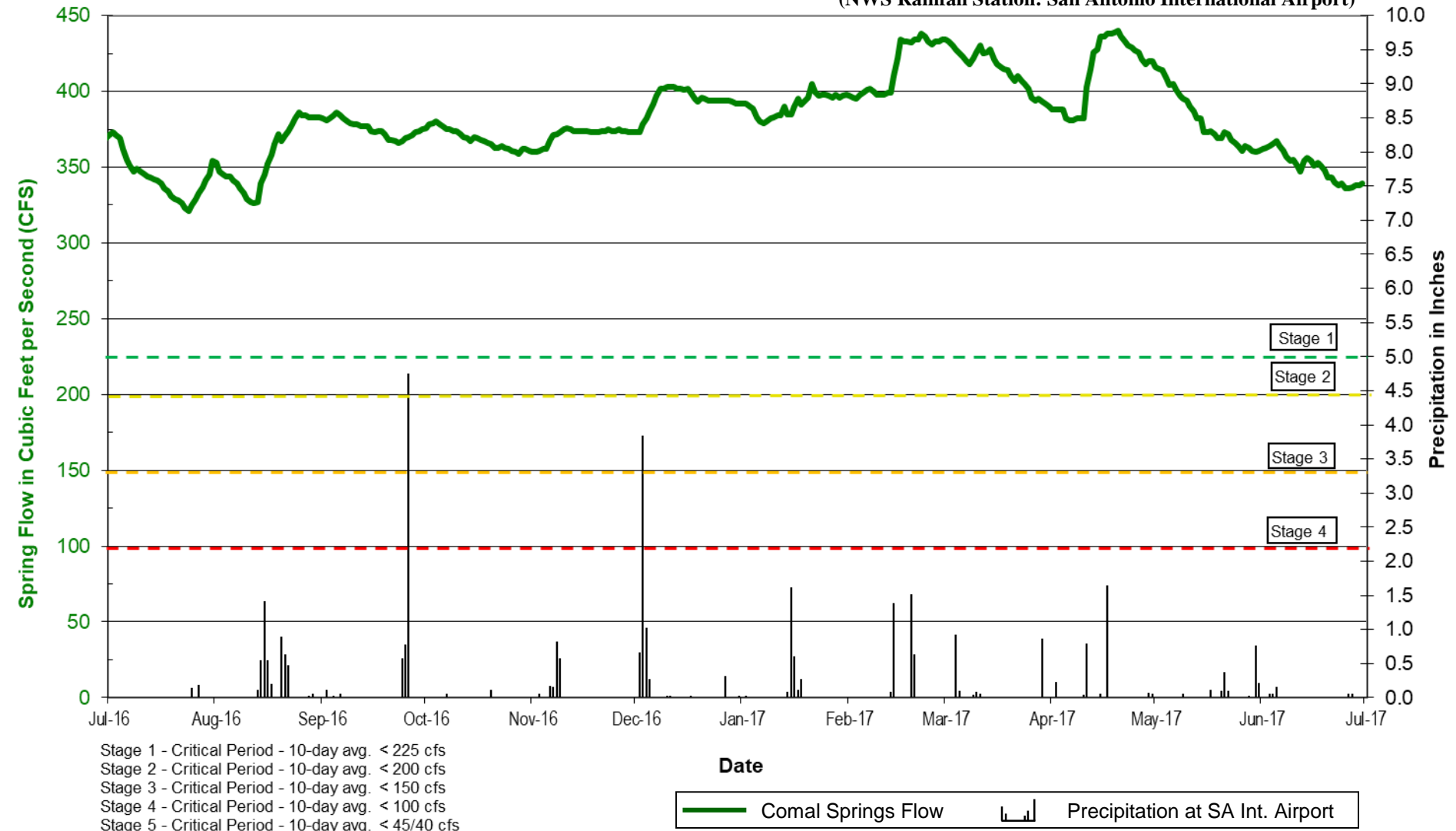
Hydrograph of the Bexar County Index Well (J-17) and Precipitation at San Antonio

(NWS Rainfall Station: San Antonio International Airport)



Hydrograph of the Comal Springs Discharge and Precipitation at San Antonio

(NWS Rainfall Station: San Antonio International Airport)

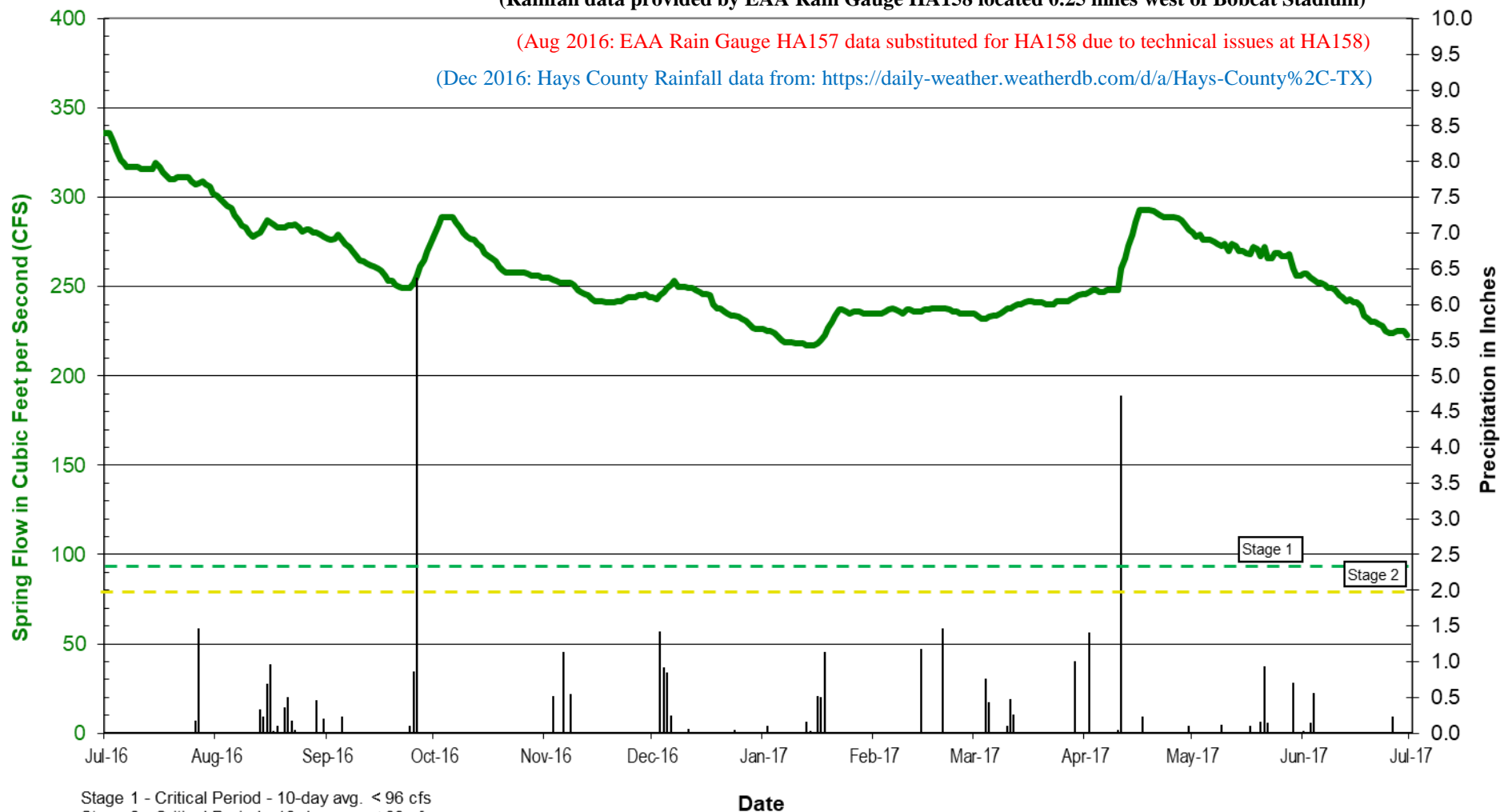


Hydrograph of the San Marcos Springs Discharge and Precipitation at San Marcos

(Rainfall data provided by EAA Rain Gauge HA158 located 0.25 miles west of Bobcat Stadium)

(Aug 2016: EAA Rain Gauge HA157 data substituted for HA158 due to technical issues at HA158)

(Dec 2016: Hays County Rainfall data from: <https://daily-weather.weatherdb.com/d/a/Hays-County%2C-TX>)



Stage 1 - Critical Period - 10-day avg. < 96 cfs
 Stage 2 - Critical Period - 10-day avg. < 80 cfs
 Stage 3 - None
 Stage 4 - None
 Stage 5 - None

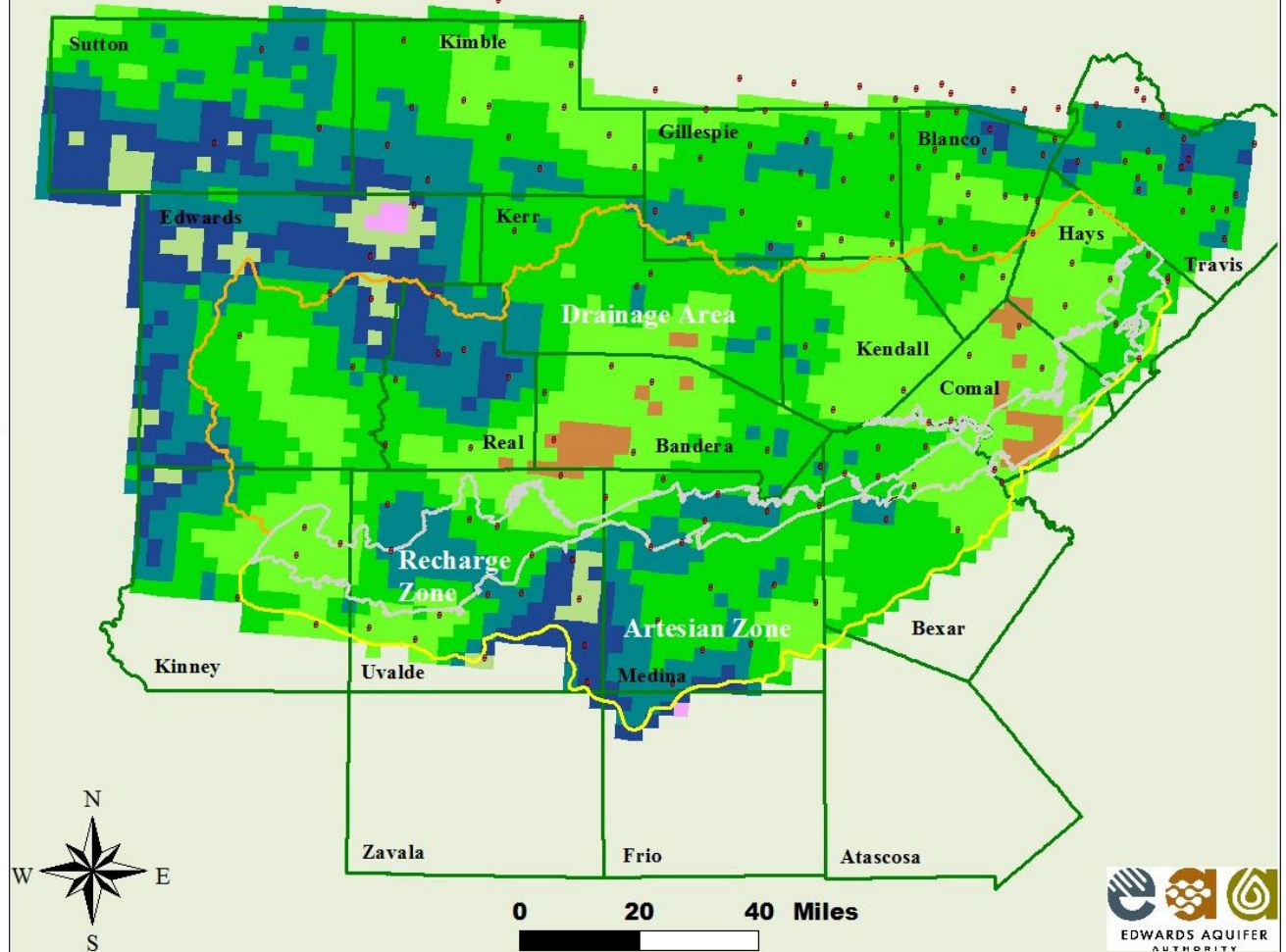
— San Marcos Springs Flow █ Precipitation at San Marcos

Calibrated 1 inch May 2017 Rainfall Totals

- Rain Gauge
- County Line
- Artesian Zone
- Drainage Area
- Recharge Zone

Rainfall Total (Inches)

- 6 - 7
- 5 - 6
- 4 - 5
- 3 - 4
- 2 - 3
- 1 - 2
- 0 - 1

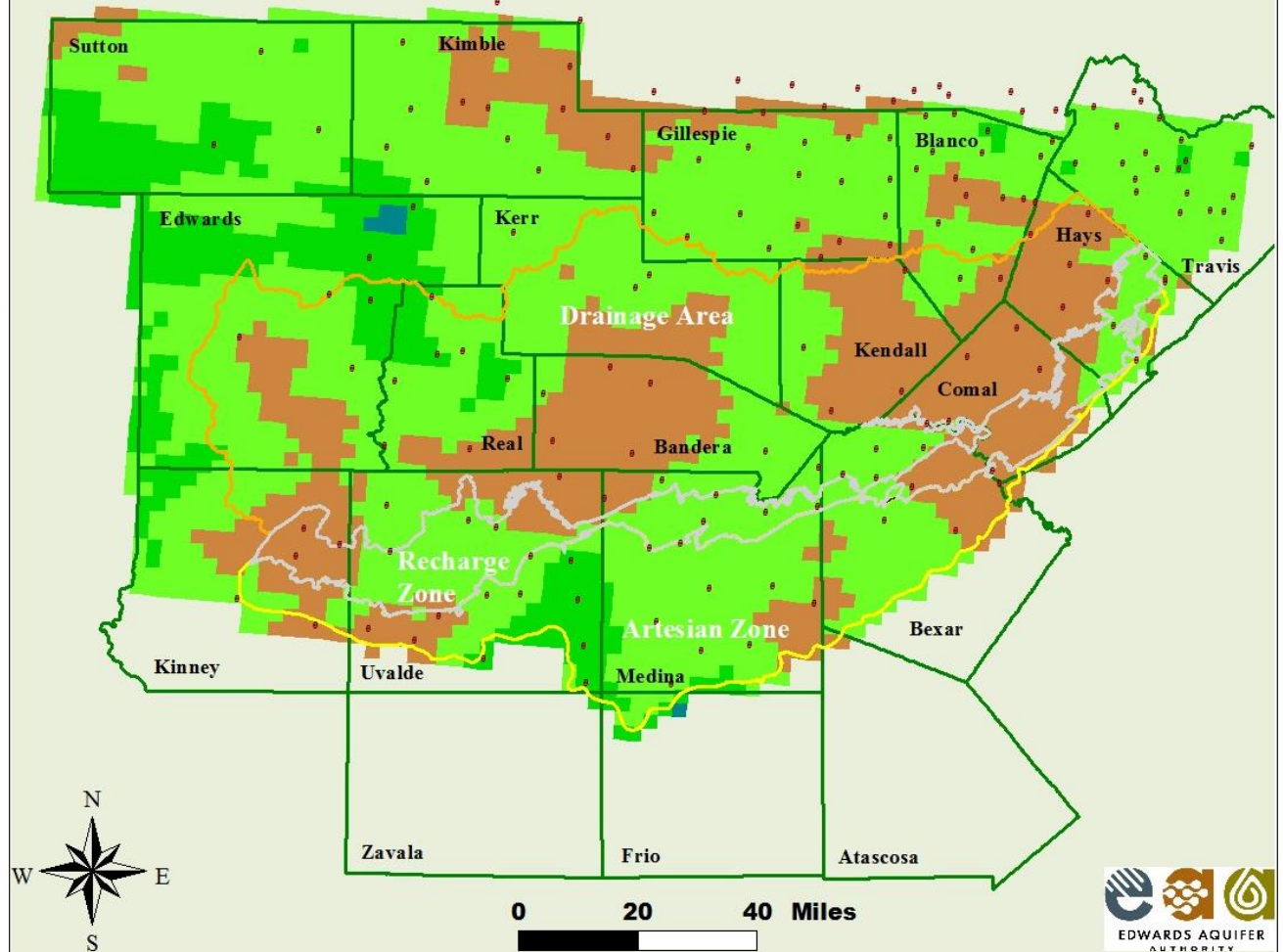


Calibrated 2 inch May 2017 Rainfall Totals

- Rain Gauge
- County Line
- Artesian Zone
- Drainage Area
- Recharge Zone

Rainfall Total (Inches)

- 6 - 8
- 4 - 6
- 2 - 4
- 0 - 2



Real-time Precipitation Gauging System and Hydrologic Data Collection

The Edwards Aquifer Authority (EAA) operates 74 “real-time” precipitation gauges that record data on six-minute intervals and transmit these data to the EAA’s office via a radio-telemetry system. Rain gauges are located on the Edwards Aquifer Contributing Zone, Recharge Zone, and Artesian Zone. Acquired data have many uses including aquifer recharge calculations, production of rainfall maps, and in a variety of research projects. The EAA also collects water level data from a series of aquifer monitor wells in the region, including two index wells: Well J-27, in Uvalde County and Well J-17, in Bexar County. Water level data from the Hondo City well in Medina County are also included in this data brief. Through a cooperative agreement with the U.S. Geological Survey, the EAA monitors the discharge at Comal Springs and San Marcos Springs.

Rainfall Evaluation – April 2017 Vieux & Associates Doppler Rainfall Map

The calibrated May 2017 Rainfall Totals Map was prepared by Vieux & Associates for the EAA using NEXRAD Doppler Radar and the EAA’s precipitation gauge data. Calibrating the NEXRAD data with the EAA’s precipitation gauge data improves the accuracy of the precipitation maps and is calculated using a four-kilometer grid system. Rain gauge locations are indicated on the map.

Rainfall Evaluation – May 2017 Rainfall

May can be categorized as a dry month, as most areas received below “normal” rainfall. The most significant rainfall occurred in two areas: (1) Northern Edwards into southern Sutton County and northwest Real County just inside the Contributing Zone where between 3 and 7 inches were recorded; (2) Along the Medina/Uvalde County boundary south into southern Medina County in the Artesian Zone where between 2 and 6 inches were recorded. The entire Contributing Zone received between 0 and 6 inches, the bulk of which occurred in central to northern Real County. Elsewhere, only 0 – 4 inches was recorded. The Recharge Zone had amounts ranging between 0 – 2 in eastern counties to 2 – 4 inches in western counties. The Artesian Zone had recorded amounts of between 1 and 6 inches; the most occurring in eastern Uvalde into southwestern Medina County where between 2 and 6 inches was recorded.

Rain Evaluation – Precipitation Gauge Data – May 2017

The June 2017 maximum monthly total rainfall amounts in the EAA's gauges ranged from 0.13 to 3.97 inches. The highest reported 24-hour rainfall events from the EAA's precipitation gauge network in June, by county, were as follows:

Bandera, 1.63 inches; Bexar, 0.92 inches; Blanco, 0.79 inches; Comal, 3.60 inches; Edwards, 0.81 inches; Hays, 2.36 inches; Kendall, 1.18 inches; Kinney, 2.03 inches; Medina, 2.36 inches; Real, 1.12 inches; and Uvalde County, 1.80 inches. The highest 24-hour rain event recorded in the region was 3.60 inches of rain that occurred on June 4th at a gauge located on the west side of FM484, about 5 miles south of the intersection of FM484 & FM32 in northern Comal County.

Evaluation of June 2017 Aquifer Levels and Spring Discharges

Aquifer levels are a function of rainfall/recharge amounts, Springflow, and aquifer demand throughout the region. The San Antonio Pool Index Well (J-17) *decreased* 7.9 feet to 663.9 feet above mean sea level (msl) while the City of Hondo Well *decreased* 13.1 feet to 701.5 feet msl. Likewise, the Uvalde Pool Well (J-27), *decreased* 1.1 feet to 875.1 feet msl.

The June daily average springflow for Comal Springs, in turn, *decreased* 22 cubic feet per second (cfs) to 339 cfs, which is 51 cfs *above* the June monthly average discharge of 288 cfs. Likewise, the daily average springflow for San Marcos Springs *decreased* 33 cfs to 223 cfs, which is 30 cfs *above* the monthly average discharge of 193 cfs for June. Please note that the discharge amounts are estimates and may be adjusted up or down as more direct flow measurements are obtained.

Summary of Current Aquifer Levels and Spring Discharges – July 2017

The official daily high water level for the Uvalde Pool Index Well (J-27) was 874.8 ft. msl on Wednesday, July 5, 2017, which is 8.7 ft. *above* the J-27 July monthly average of 866.1 ft. msl. The daily high water level at the San Antonio Pool Index Well (J-17) was 661.5 ft. msl on July 5, 2017; only 1.2 ft. *above* the J-17 July monthly average of 660.3 ft. msl. The daily average discharge at Comal Springs on Tuesday, July 4, 2017, was reported to be 330 cfs, 54 cfs *above* the July average of 276 cfs while the daily average discharge at San Marcos Springs on July 4, 2017 was reported to be 210 cfs, which is 23 cfs *above* the July average of 187 cfs. Please note that discharge values are estimates and may be adjusted up or down as more direct flow measurements are obtained.

Summary of Current Regional Aquifer Conditions

June temperatures were above normal while precipitation was below normal as the Edwards Aquifer region experienced some dry conditions. However, the Edwards Aquifer System continues to remain above Critical Period Management (CPM) thresholds. The U.S. Department of Agriculture - U.S. Drought Monitor indicated that although Tropical Storm Cindy brought some relief to the eastern areas of Texas, zero to very little rain fell in south-central and west Texas. Abnormally dry to severe drought conditions exist in the southern end of the panhandle in north Texas, the San Angelo area in west-central Texas, the Hill Country in the San Antonio area, and the Brownsville area. Consequently, just under about 25% of Texas is experiencing some form of seasonal or short-term drought condition.

The National Weather Service (NWS) Climate Prediction Center (CPC) reported that, “ENSO-neutral conditions are favored (50 to ~55% chance) through the Northern Hemisphere fall 2017.” Moreover, the NWS - Climate Prediction Center’s Three Month Outlook forecasts above normal temperatures, with above normal precipitation for south-central Texas into September 2017. Therefore, the US Seasonal Drought Outlook shows that where drought conditions exist, removal is likely across the State of Texas.