

HYDROLOGIC DATA BRIEF FOR THE EDWARDS AQUIFER THROUGH JULY 2016

Prepared by

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UVALDE COUNTY RAINFALL (in inches) for 2016

	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sept.	Oct.	Nov.	Dec.
Monthly Rainfall (2016)	0.86	1.60	0.68	1.99	7.21	3.01	1.48					
Historical Monthly Avg	1.13	1.24	1.32	2.36	3.16	2.83	1.95	2.16	2.60	2.57	1.41	1.34
Difference	-0.27	0.36	-0.64	-0.37	4.05	0.18	-0.47					

Historical Yearly Average	24.07
Total for January - July 2016	16.83
Historical Average January - July	13.99
Total Difference for Year to Date	2.84
Percent of Average Year to Date	120%

Data from EAA rain gauge UV033 located 4.4 miles south of the City of Uvalde.

MEDINA COUNTY RAINFALL (in inches) for 2016

	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sept.	Oct.	Nov.	Dec.
Monthly Rainfall (2016)	0.54	1.42	1.51	2.87	6.95	1.74	1.56					
Historical Monthly Avg	1.43	1.94	1.53	2.66	3.79	3.38	1.88	2.76	3.00	3.03	1.73	1.43
Difference	-0.89	-0.52	-0.02	0.21	3.16	-1.64	-0.32					

Historical Yearly Average	28.56
Total for January - July 2016	16.59
Historical Average January - July	16.61
Total Difference for Year to Date	-0.02
Percent of Average Year to Date	100%

Data from National Weather Service (NWS) rainfall station at Hondo Airport.

BEXAR COUNTY RAINFALL (in inches) for 2016

	Jan.	Feb.	Mar.	Apr.	May.	Jun.	Jul.	Aug.	Sept.	Oct.	Nov.	Dec.
Monthly Rainfall (2016)	1.38	1.55	3.56	6.19	9.14	2.39	0.33					
Historical Monthly Avg	1.61	1.90	1.68	2.53	3.99	3.57	1.83	2.58	3.29	3.29	2.11	1.72
Difference	-0.23	-0.35	1.88	3.66	5.15	-1.18	-1.50					

Historical Yearly Average	30.10
Total for January - July 2016	24.54
Historical Average January - July	17.11
Total Difference for Year to Date	7.43
Percent of Average Year to Date	143%

Data from NWS rainfall station located at San Antonio International Airport.

COMAL COUNTY RAINFALL (in inches) for 2016

	Jan.	Feb.	Mar.	Apr.	May.	Jun.	Jul.	Aug.	Sept.	Oct.	Nov.	Dec.
Monthly Rainfall (2016)	1.00	1.01	2.76	4.42	5.60	2.00	3.12					
Historical Monthly Avg	2.36	2.09	1.92	2.68	4.86	4.64	2.02	2.16	3.39	3.84	2.79	2.75
Difference	-1.36	-1.08	0.84	1.74	0.74	-2.64	1.10					

Historical Yearly Average	35.50
Total for January - July 2016	19.91
Historical Average January - July	20.57
Total Difference for Year to Date	-0.66
Percent of Average Year to Date	97%

Data from NWS rainfall station located in New Braunfels.

HAYS COUNTY RAINFALL (in inches) for 2016

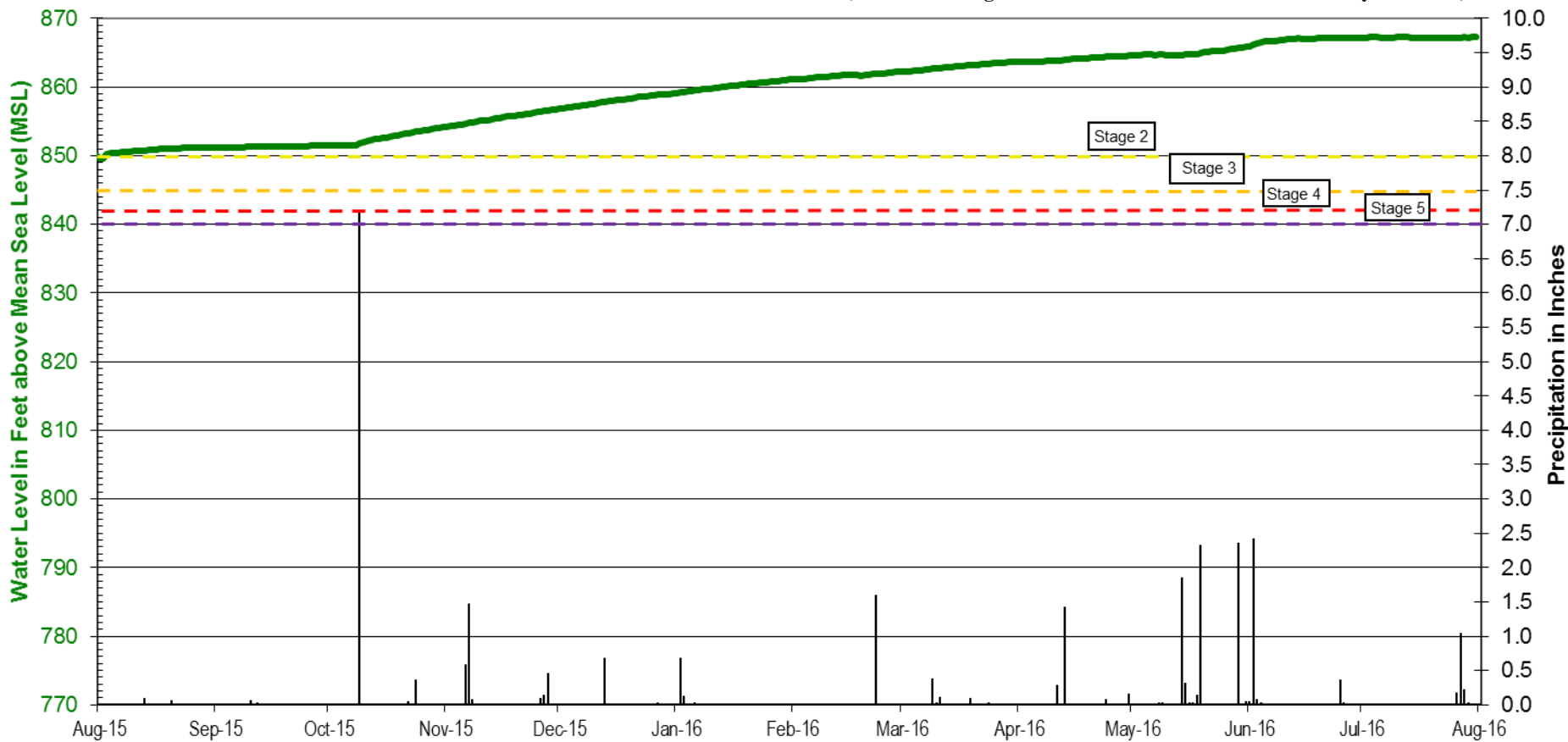
	Jan.	Feb.	Mar.	Apr.	May.	Jun.	Jul.	Aug.	Sept.	Oct.	Nov.	Dec.
Monthly Rainfall (2016)	0.96	1.37	1.84	0.97	6.95	1.57	1.64					
Historical Monthly Avg	2.00	2.93	1.84	3.29	3.68	3.56	1.77	2.31	4.52	3.61	2.23	2.01
Difference	-1.04	-1.56	0.00	-2.32	3.27	-1.99	-0.13					

Historical Yearly Average	33.75
Total for January - July 2016	15.30
Historical Average January - July	19.07
Total Difference for Year to Date	-3.77
Percent of Average Year to Date	80%

Data provided by EAA rain gauge HA158 located 0.25 miles west of Bobcat Stadium.
FAA Rainfall Station: San Marcos Airport - out of service.

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

(EAA Rain Gauge: UV033 located 4.4 miles south of the City of Uvalde)



- Stage 1 - None
- Stage 2 - Critical Period - 10-day avg. < 850' MSL
- Stage 3 - Critical Period - 10-day avg. < 845' MSL
- Stage 4 - Critical Period - 10-day avg. < 842' MSL
- Stage 5 - Critical Period - 10-day avg. < 840' MSL

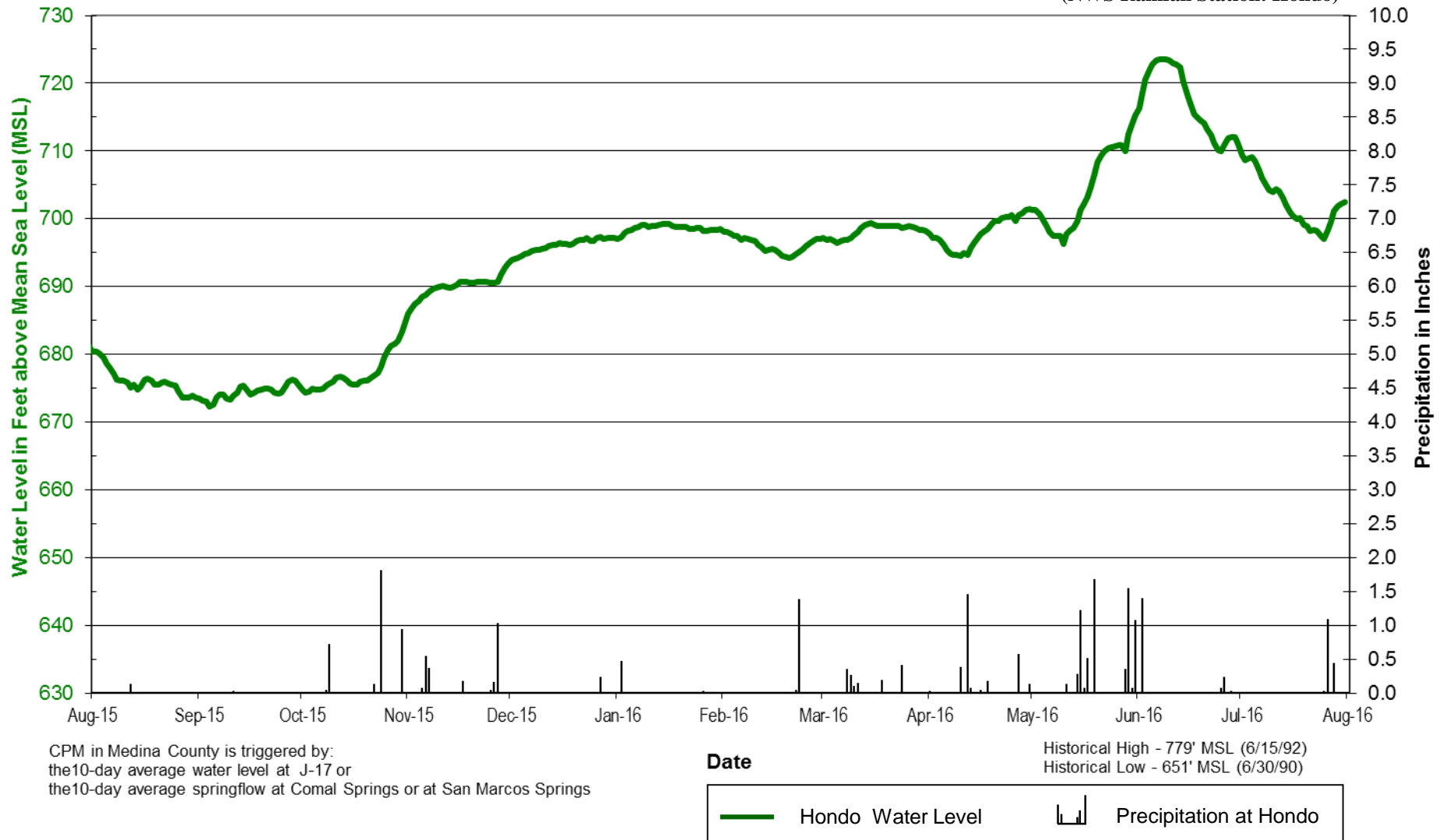
Date

Historical High - 889' MSL (6/15/87)
Historical Low - 811' MSL (4/13/57)



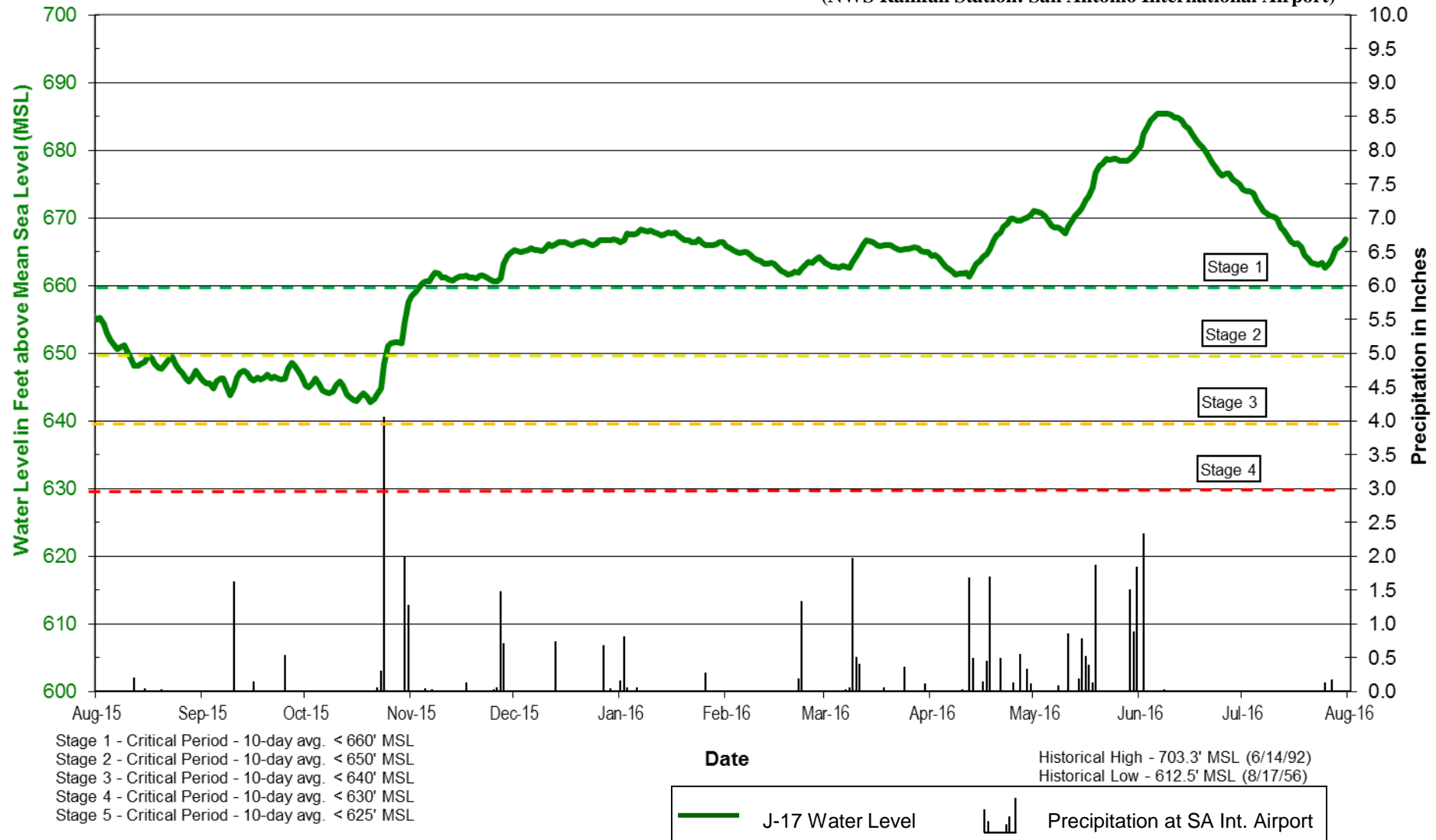
Hydrograph of the Medina County Hondo City Well and Precipitation at Hondo

(NWS Rainfall Station: Hondo)



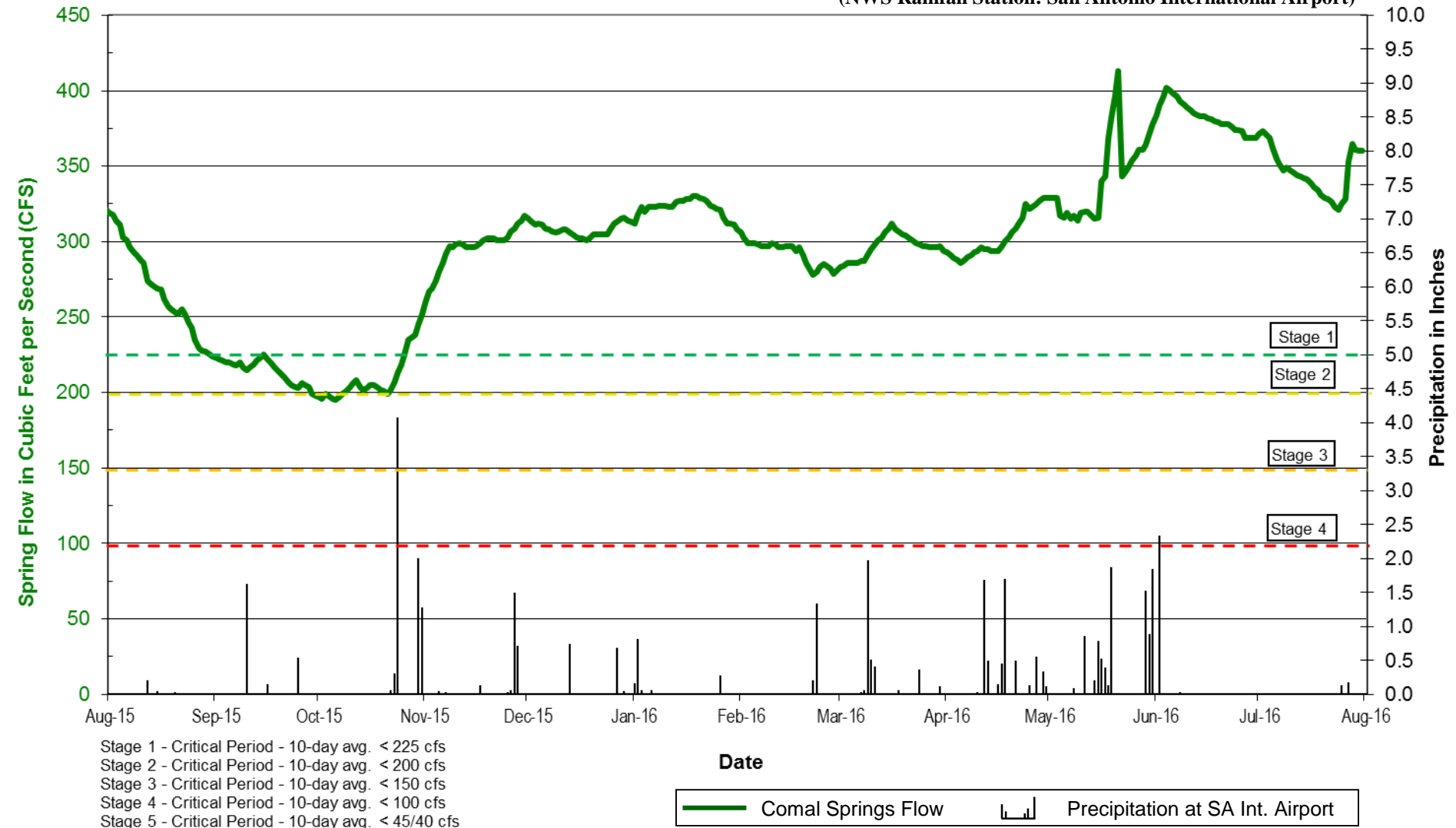
Hydrograph of the Bexar County Index Well (J-17) and Precipitation at San Antonio

(NWS Rainfall Station: San Antonio International Airport)



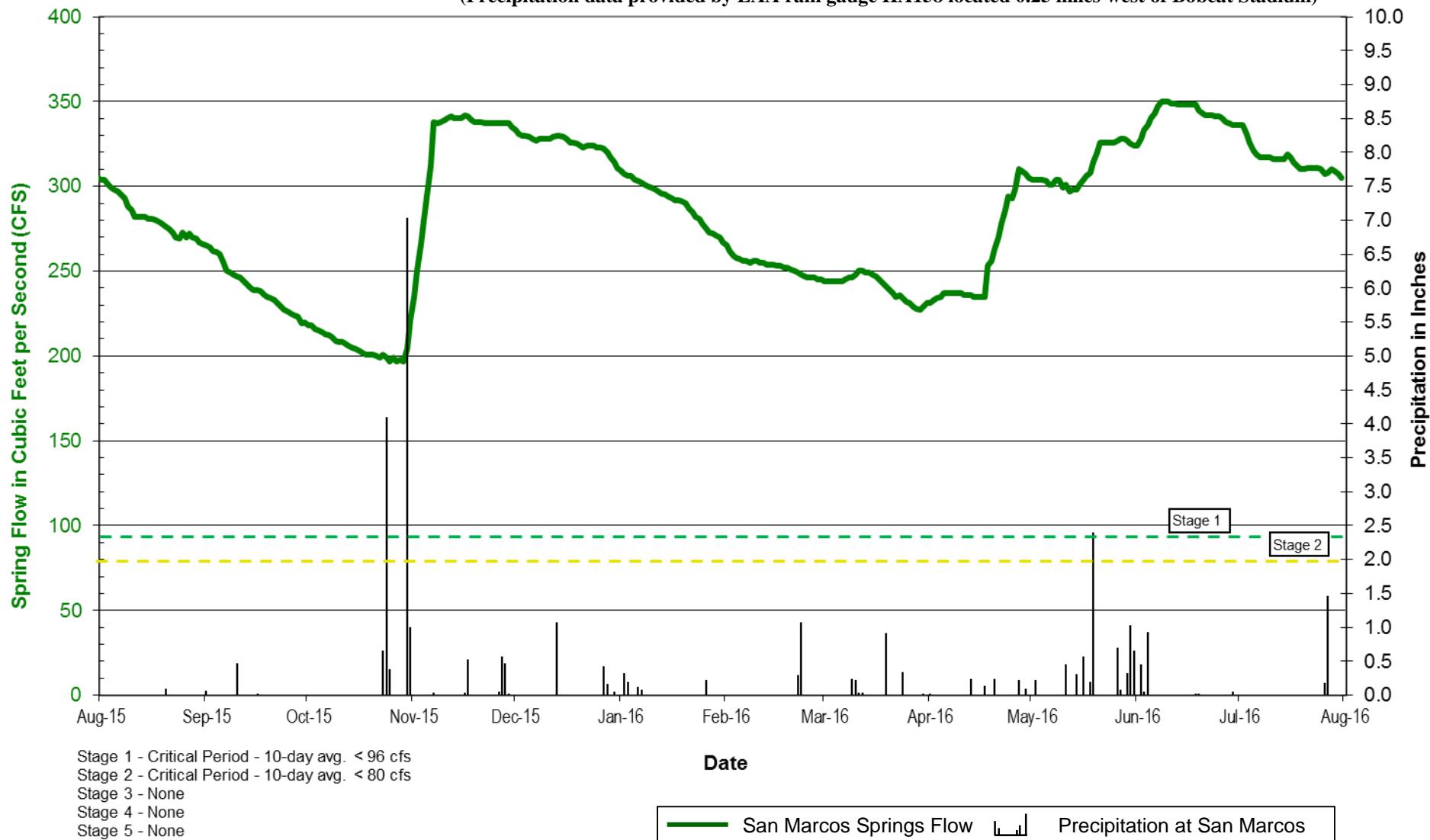
Hydrograph of the Comal Springs Discharge and Precipitation at San Antonio

(NWS Rainfall Station: San Antonio International Airport)



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

(Precipitation data provided by EAA rain gauge HA158 located 0.25 miles west of Bobcat Stadium)










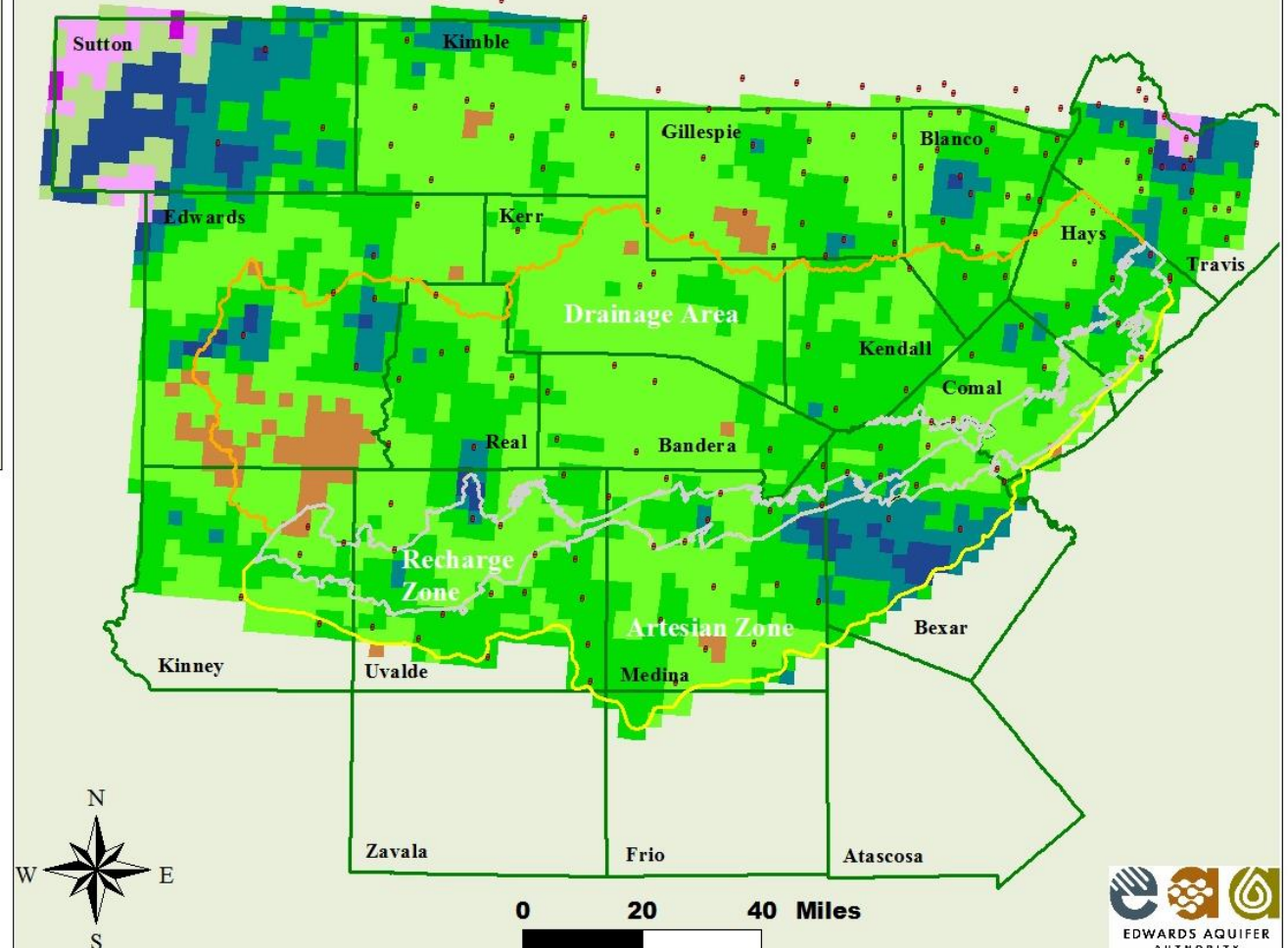
Calibrated 1 inch scale

June 2016 Rainfall Totals

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

Rainfall Total (Inches)

-  7 - 8
-  6 - 7
-  5 - 6
-  4 - 5
-  3 - 4
-  2 - 3
-  1 - 2
-  0 - 1



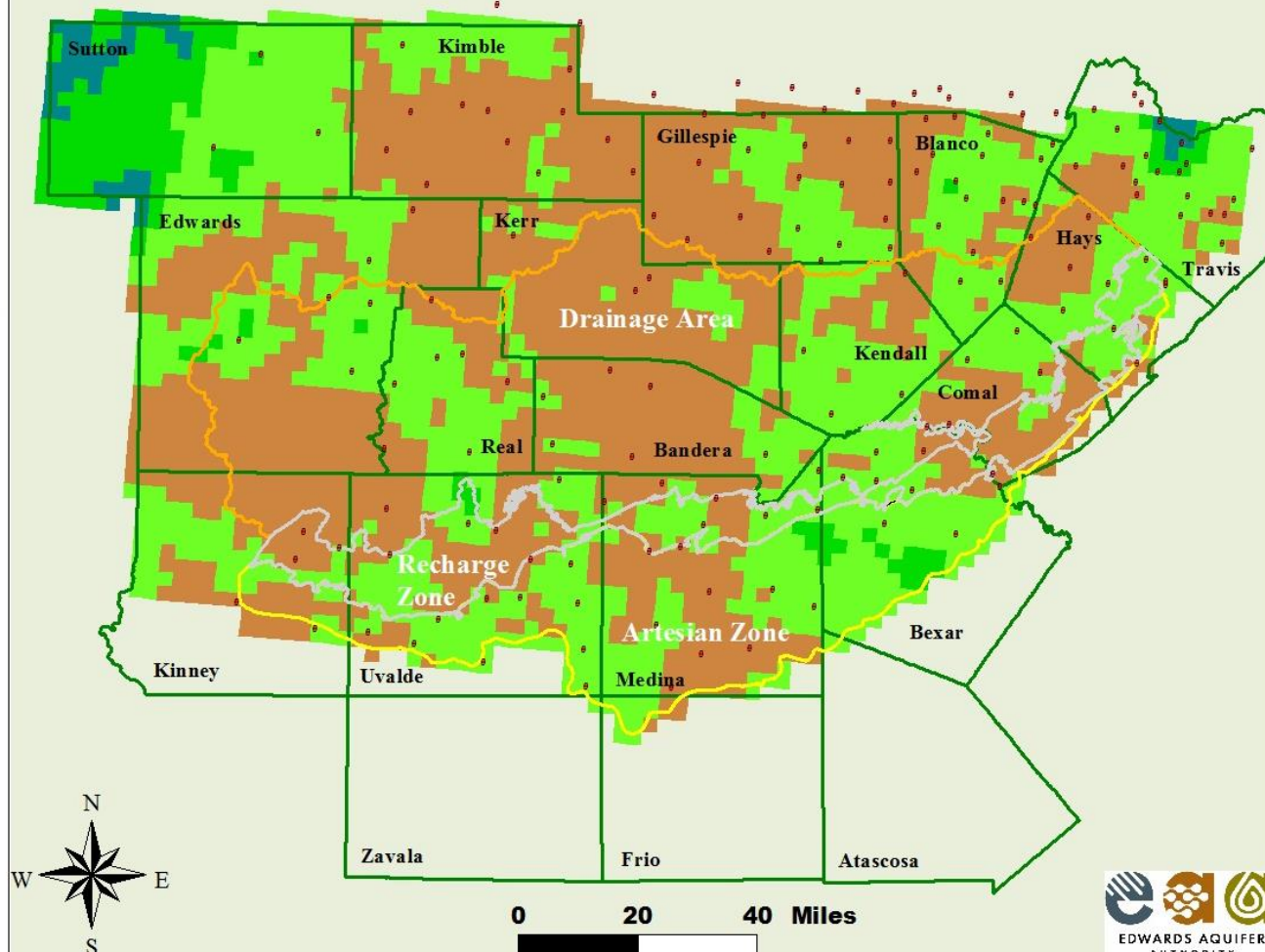
Calibrated 2 inch scale

June 2016 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 – June 2016 Vieux & Associates Doppler Rainfall Map

The calibrated June 2016 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 map and is calculated using a four-kilometer grid system. Rain gauge locations are indicated on the map.

Entering the summer season, the month of June brought widely scattered light showers with some intense storms (outside the area). The heaviest rainfall totals occurred in several pockets across the Edwards Aquifer system. The entire Contributing Zone (Drainage Area) received between 0 and 6 inches, while in central and eastern Edwards County, local storms recorded between 2 and 5 inches of rainfall. Another local area on the Recharge Zone / Contributing Zone boundary in Real and Uvalde County recorded between 3 and 5 inches. Likewise, the entire Recharge Zone recorded between 0 and 5 inches of rainfall with northeastern Medina and northwestern Bexar recording between 3 and 5 inches. Most areas of the Artesian Zone received beneficial rainfall as between 0 and 5 inches was recorded (the most in northwestern to southeastern Bexar County at 3 to 6 recorded inches).

Rain Evaluation – July 2016 Precipitation Gauge Data

With the exception of Comal County, all areas received below average rainfall in the month of July. As such, the July 2016 maximum monthly total rainfall amounts in the EAA's gauges ranged from 0.03 to 2.87 inches. The highest reported 24-hour rainfall event from the EAA's precipitation gauge network in July, by county, were as follows: Bandera, 1.07 inches; Bexar, 1.79 inches; Blanco, 0.17 inches; Comal, 1.20 inches; Edwards, 0.95 inches; Hays, 1.46 inches; Kendall, 0.97 inches; Kinney, 0.28 inches; Medina, 2.16 inches; Real, 1.53 inches; and Uvalde County, 2.76 inches. The highest 24-hour rain event recorded in the region was 2.76 inches of rain that occurred on July 27 at a gauge located on the south side of US-90, about 1.0 mile west of the intersection of TX-127 / FM-187 and US-90 in Uvalde County.

Evaluation of July 2016 Aquifer Levels and Spring Discharge

The first full month of Summer 2016 (July) produced little rainfall across the area. As a result, aquifer levels and springflow discharges responded accordingly. The San Antonio Pool Index Well (J-17) *decreased* 8.2 feet to 666.8 feet above mean sea level (msl) while the City of Hondo Well *decreased* 8.6 feet to 702.4 feet msl. The Uvalde Pool Well (J-27), however, remained essentially the same with an *increase* of 0.1 foot to 867.3 feet msl.

The July daily average springflow for Comal Springs, *decreased* 9 cubic feet per second (cfs) to 360 cfs, which is 84 cfs *above* the July monthly average discharge of 276 cfs. Likewise, the daily average springflow for San Marcos Springs *decreased* 31 cfs to 306 cfs, which is 121 cfs *above* the monthly average discharge of 184 cfs for July. 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 Discharge

The official daily high water level for the Uvalde Pool Well (J-27) was 867.3 ft. msl on August 2, 2016, which is 1.2 ft. *above* the J-27 August monthly average of 866.1 ft. msl. The daily high water level at the San Antonio Pool Index Well (J-17) was 665.6 ft. msl on August 2, 2016; 7.8 ft. *above* the J-17 August monthly average of 657.8 ft. msl. The daily average discharge at Comal Springs on August 1, 2016, was 358 cfs, 97 cfs *above* the August average of 261 cfs while the daily average discharge at San Marcos Springs on August 1, 2016 was 305 cfs, 135 cfs *above* the August average of 170 cfs.

Summary of Current Regional Aquifer Conditions

The month of July brought below average rainfall to the San Antonio Pool of the Edwards Aquifer system. However, with late July storms, the Edwards Aquifer Region remained above Critical Period Management (CPM) thresholds. The U.S. Department of Agriculture - U.S. Drought Monitor indicated that the hot, mostly dry weather that persisted in the southern plains led to a large increase in abnormal dryness and the return of moderate drought in some areas. As a result, about 36% of Texas returned to abnormally dry to moderate drought conditions. From the Hill Country south to the Gulf Coastal Plain abnormally dry conditions now exist, while in south-central Texas, from the Del Rio area southeastward along the Rio Grande, some moderate dry conditions exist as far south as McAllen.

The Climate Prediction Center (CPC) reports that currently, “ENSO-neutral conditions are present.” However, with lowering eastern Pacific sea-surface temperatures, “La Niña is favored to develop during August-October 2016, with about a 55-60% chance of La Niña during the fall and winter 2016-17.” With below average precipitation and above average temperatures, the US Seasonal Drought Outlook shows drought development likely or persisting in central to southwestern Texas (Del Rio area). In addition, the National Weather Service - Climate Prediction Center’s Long Range Outlook forecasts a continuation of slightly above normal temperatures and equal chances of above, below, or normal precipitation in most of south central Texas into early fall 2016; only slightly above normal precipitation is forecast along the Texas gulf coast.