HYDROLOGIC DATA BRIEF FOR THE EDWARDS AQUIFER THROUGH JANUARY 2017

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Edwards Aquifer Authority

February 8, 2017

UVALDE COUNTY RAINFALL (in inches) for 2017

	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sept.	Oct.	Nov.	Dec.
Monthly Rainfall (2017)	0.80											
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**											

30-year Normal Average	**24.60**
Total for January 2017	**0.80**
30-year Normal Average January 2017	**1.18**
Total Difference for Year to Date	**-0.38**
Percent of 30-year Normal Average Year to Date	**68%**

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											
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**											

30-year Normal Average	**26.24**
Total for January 2017	**0.41**
30-year Normal Average January 2017	**1.38**
Total Difference for Year to Date	**-0.97**
Percent of 30-year Normal Average Year to Date	**30%**

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											
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**											

30-year Normal Average	**32.27**
Total for January 2017	**2.72**
30-year Normal Average January 2017	**1.76**
Total Difference for Year to Date	**0.96**
Percent of 30-year Normal Average Year to Date	**155%**

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											
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**											

30-year Normal Average	**34.62**
Total for January 2017	**2.78**
30-year Normal Average January 2017	**1.86**
Total Difference for Year to Date	**0.92**
Percent of 30-year Normal Average Year to Date	**149%**

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											
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**											

30-year Normal Average	**35.73**
Total for January 2017	**2.46**
30-year Normal Average January 2017	**2.06**
Total Difference for Year to Date	**0.40**
Percent of 30-year Normal Average Year to Date	**119%**

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

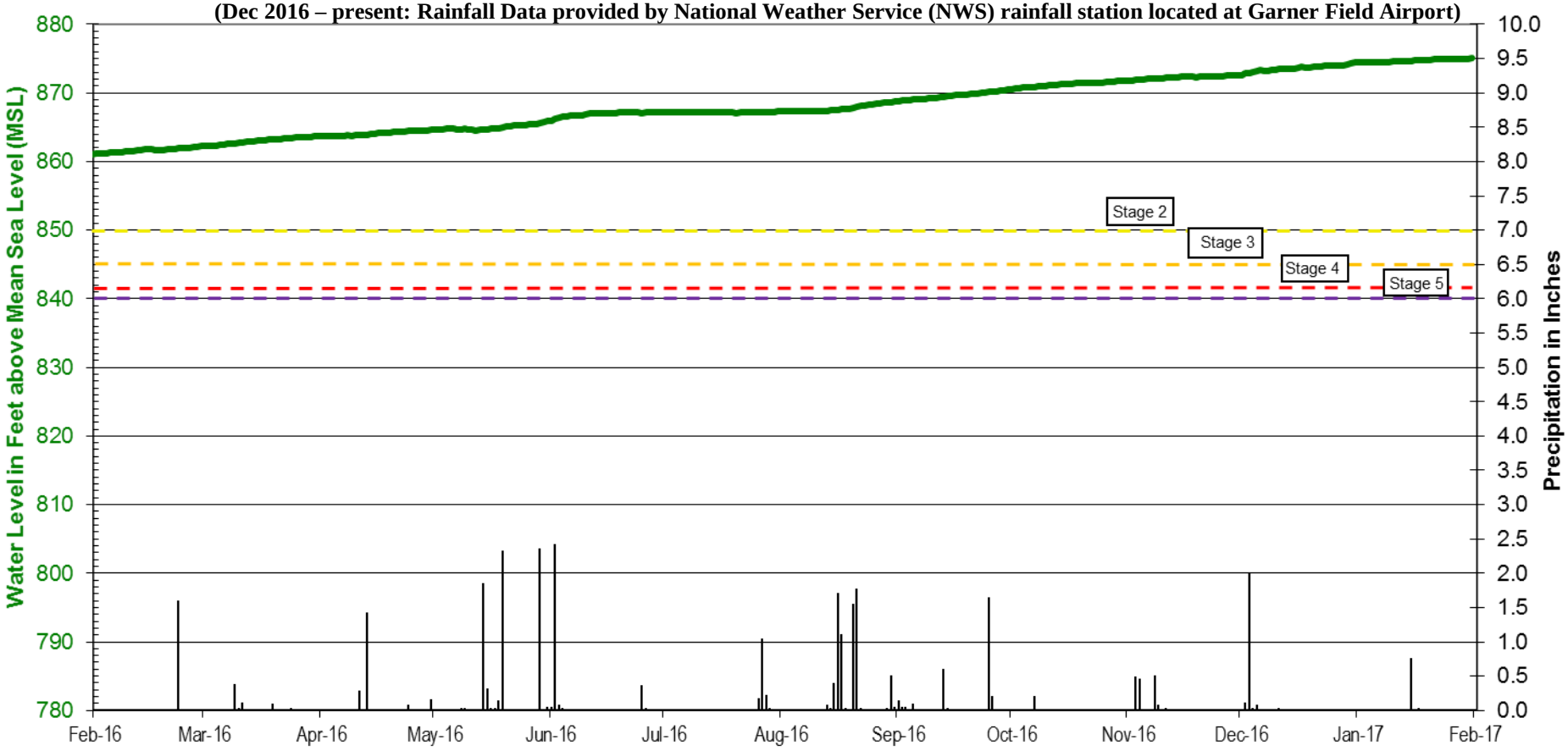
Rainfall Data provided by EAA Gauge HA158 located about 0.25 miles west of Bobcat Stadium.
NWS Rainfall Station at San Marcos Airport-out of service

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)



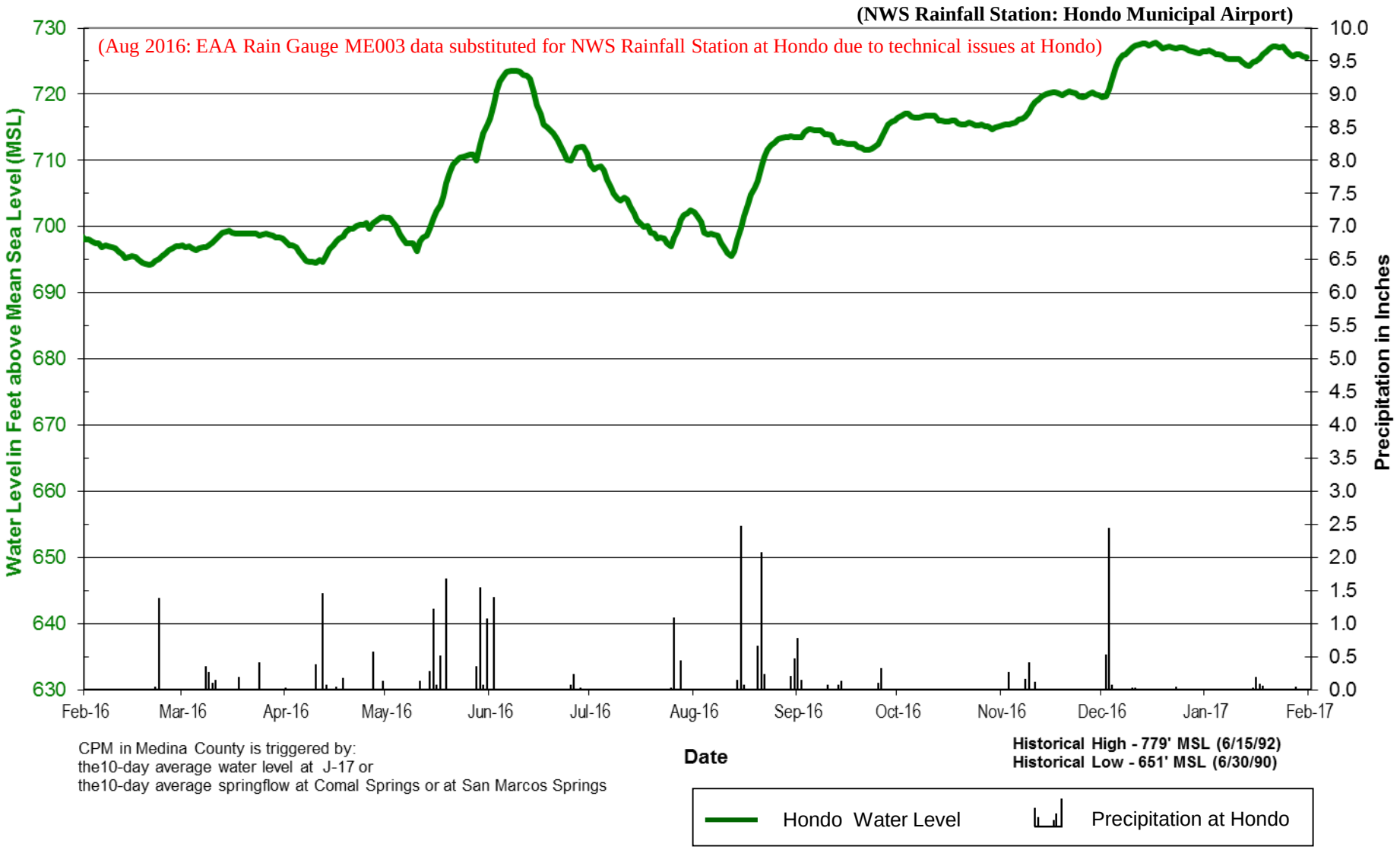
Stage 1 - None
Stage 2 - Critical Period - 10-day avg. < 850' MSL
Stage 3 - Critical Period - 10-day avg. < 845' MSL
Stage 4 - Critical Period - 10-day avg. < 842' MSL
Stage 5 - Critical Period - 10-day avg. < 840' MSL

Date

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

J-27 Water Level Precipitation at Uvalde

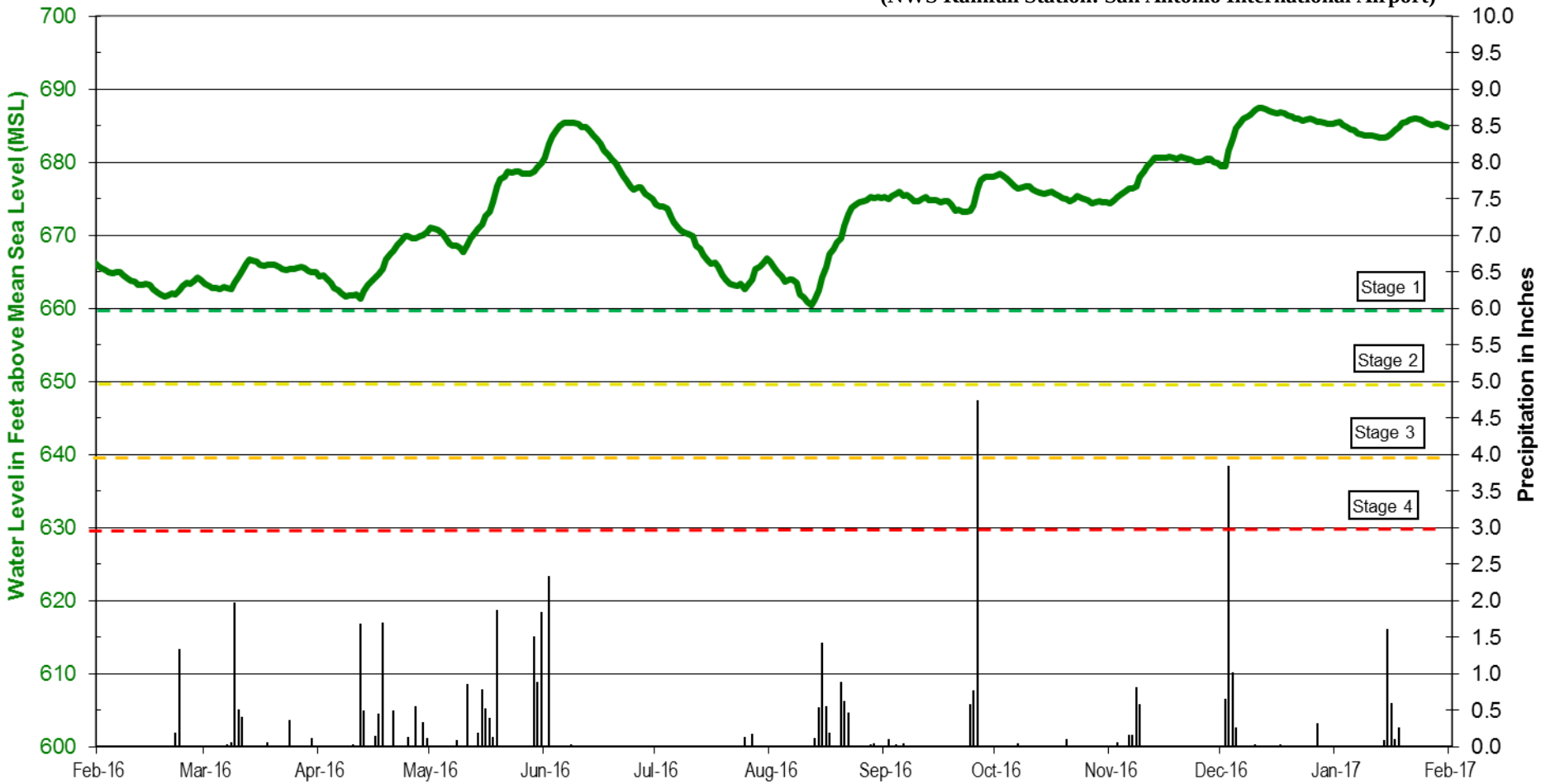
Hydrograph of the Medina County Hondo City Well and Precipitation at Hondo



CPM in Medina County is triggered by:
the10-day average water level at J-17 or
the10-day average springflow at Comal Springs or at San Marcos Springs

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

(NWS Rainfall Station: San Antonio International Airport)



Stage 1 - Critical Period - 10-day avg. < 660' MSL
Stage 2 - Critical Period - 10-day avg. < 650' MSL
Stage 3 - Critical Period - 10-day avg. < 640' MSL
Stage 4 - Critical Period - 10-day avg. < 630' MSL
Stage 5 - Critical Period - 10-day avg. < 625' MSL

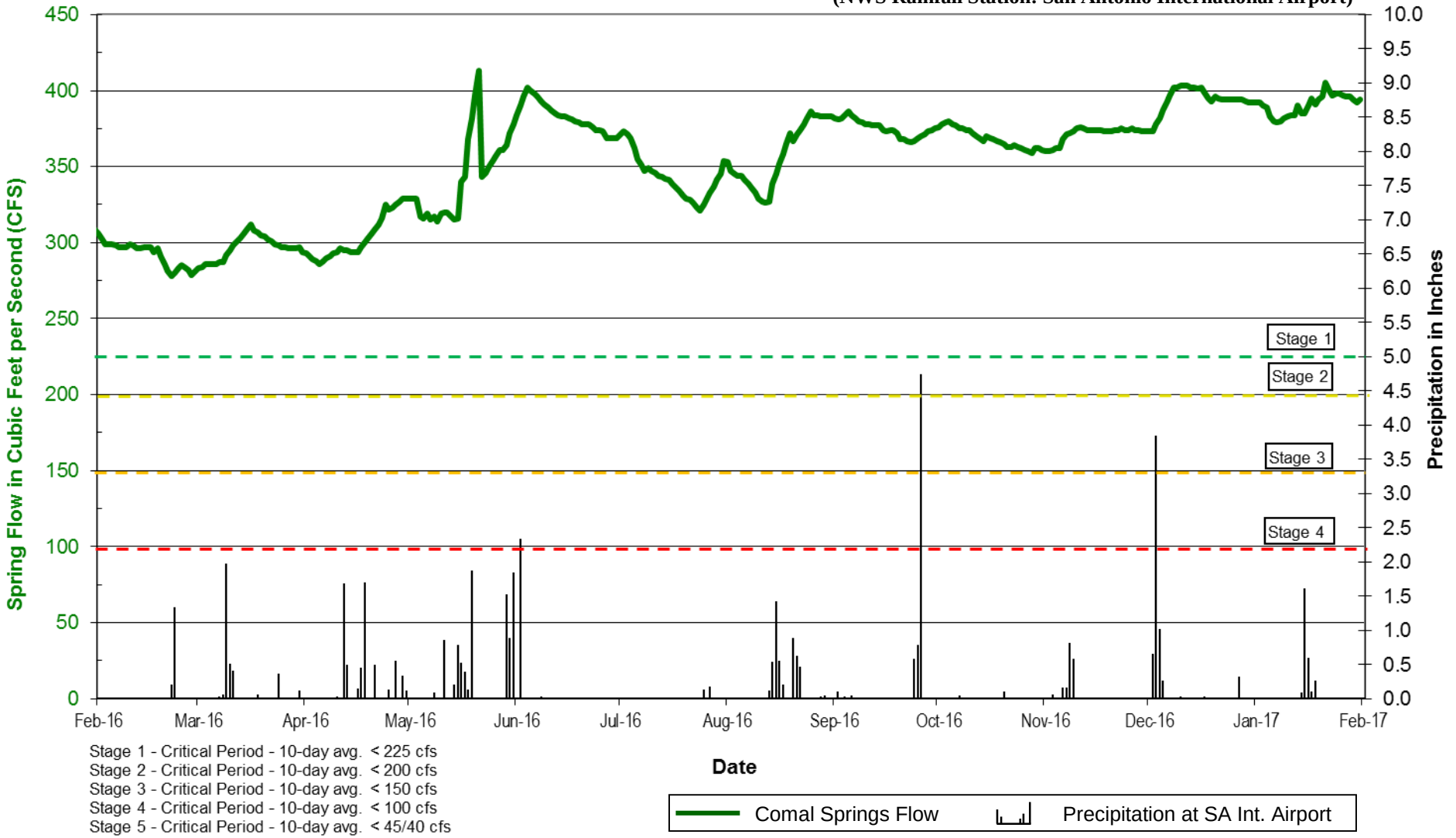
Date

Historical High - 703.3' MSL (6/14/92)
Historical Low - 612.5' MSL (8/17/56)

J-17 Water Level Precipitation at SA Int. Airport

Hydrograph of the Comal Springs Discharge and Precipitation at San Antonio

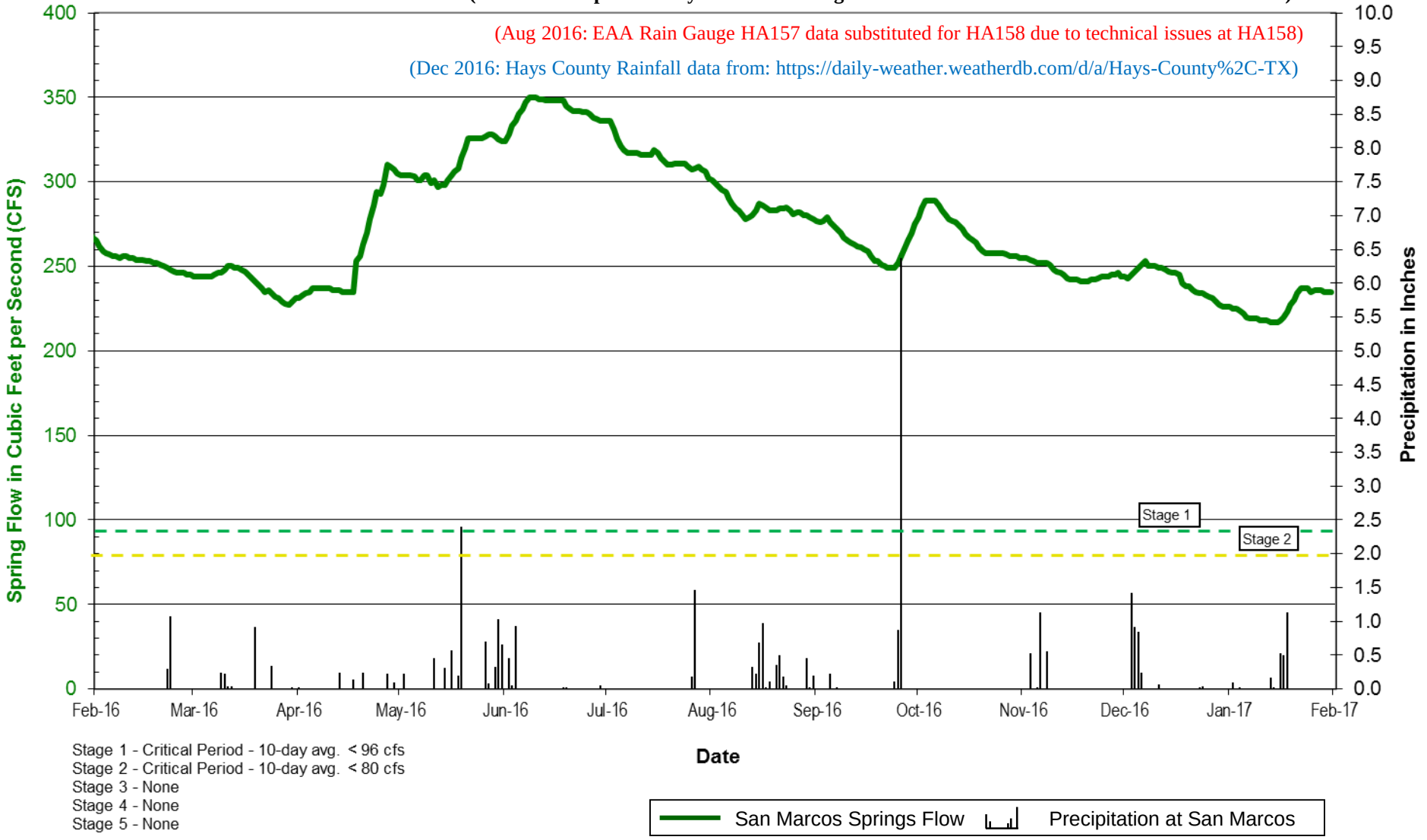
(NWS Rainfall Station: San Antonio International Airport)



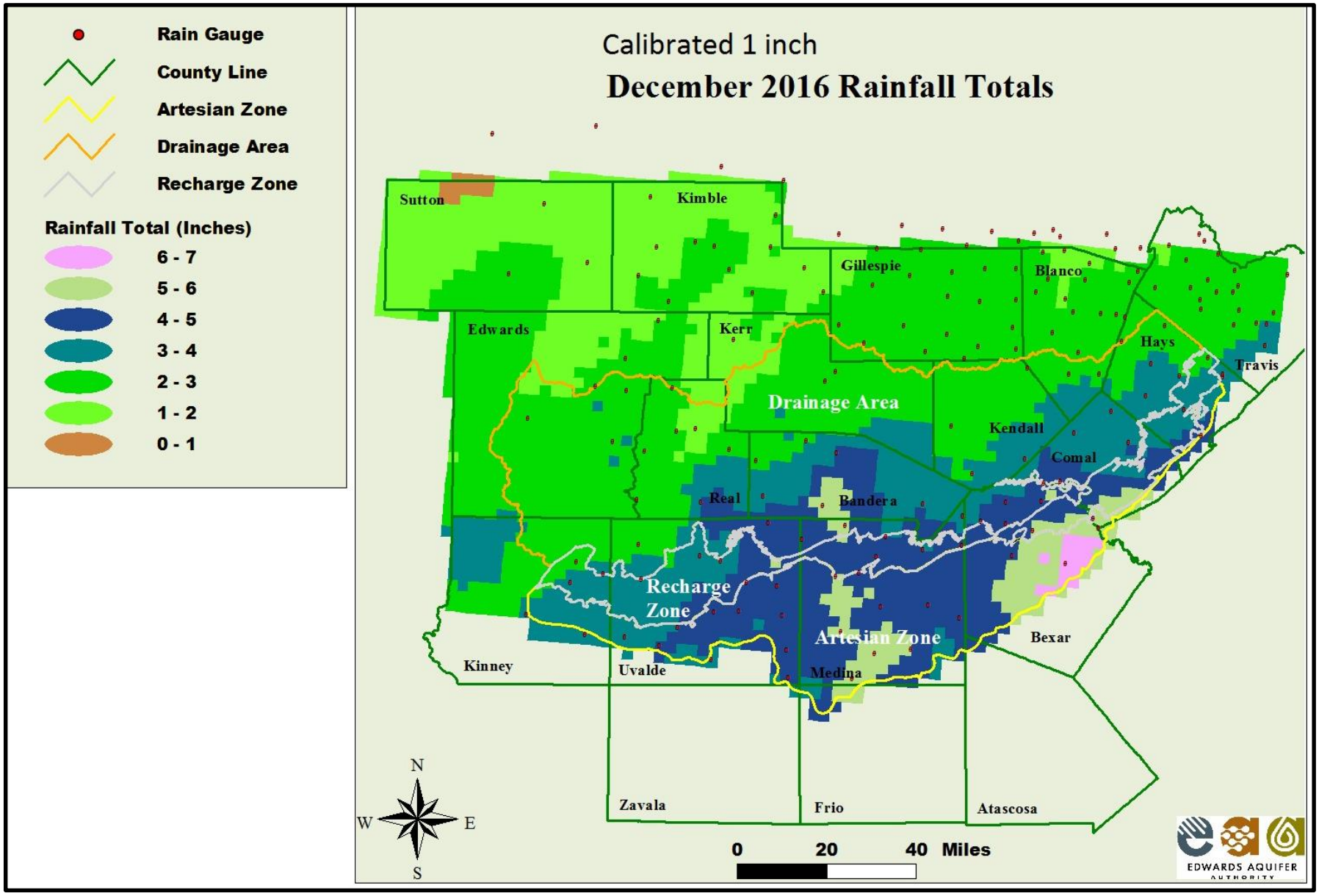
Stage 1 - Critical Period - 10-day avg. < 225 cfs
Stage 2 - Critical Period - 10-day avg. < 200 cfs
Stage 3 - Critical Period - 10-day avg. < 150 cfs
Stage 4 - Critical Period - 10-day avg. < 100 cfs
Stage 5 - Critical Period - 10-day avg. < 45/40 cfs

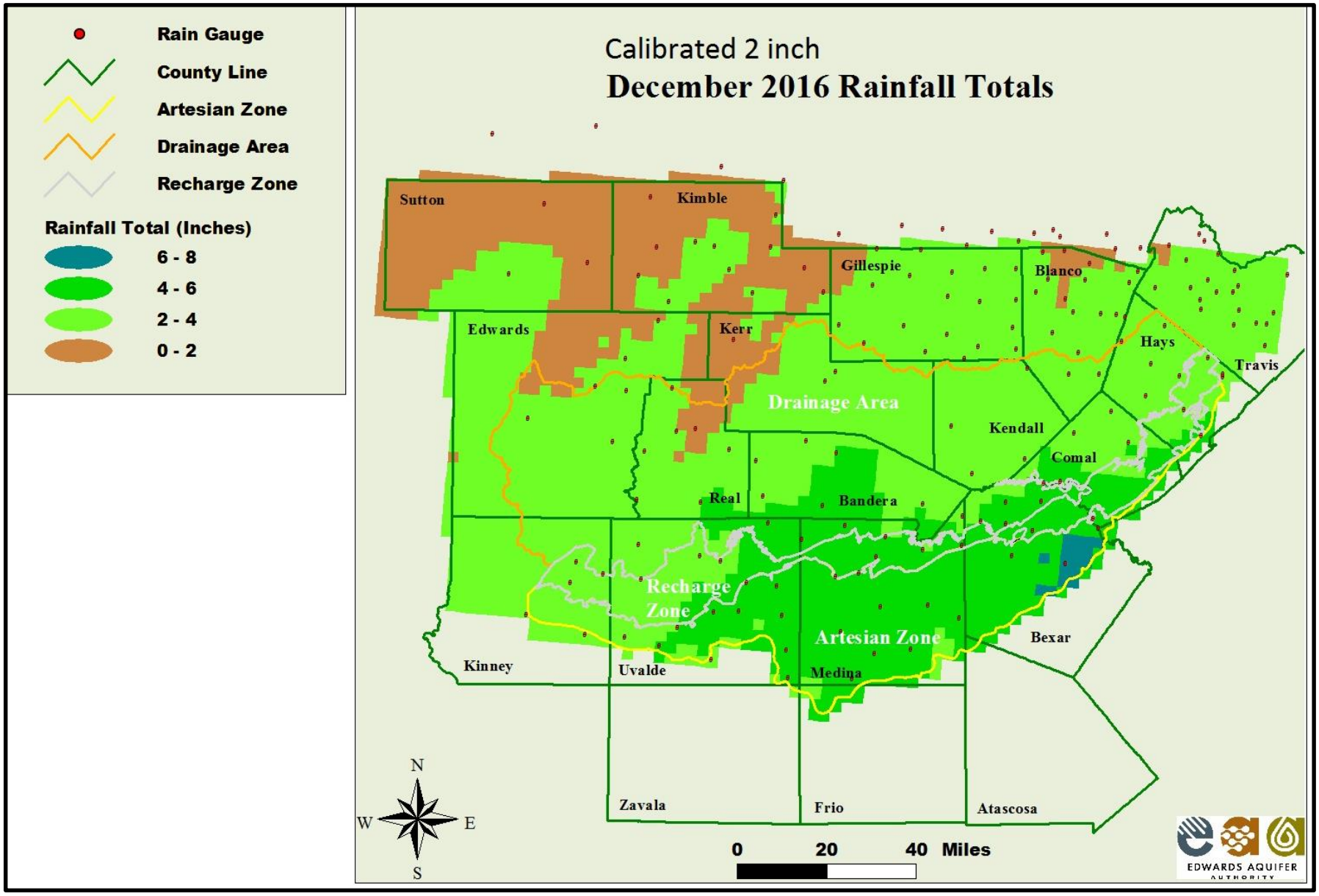
Hydrograph of the San Marcos Springs Discharge and Precipitation at San Marcos

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



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


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 1 inch
December 2016 Rainfall Totals
Sutton
Kimble
Gillespie
Blanco
Edwards
Kerr
Hays
Travis
Drainage Area
Kendall
Comal
Real
Bandera
Recharge Zone
Artesian Zone
Bexar
Kinney
Uvalde
Medina
Zavala
Frio
Atascosa
N
W
E
S
0 20 40 Miles
EDWARDS AQUIFER AUTHORITY


Rain Gauge
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Rainfall Total (Inches)
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Zavala
Frio
Atascosa
N
W
E
S
0 20 40 Miles
EDWARDS AQUIFER AUTHORITY

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 – December 2016 Vieux & Associates Doppler Rainfall Map

The calibrated December 2016 Rainfall Totals Maps were 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 maps.

All counties received above average rainfall in the month of December. The most significant rainfall occurred, however, in the southern portion of the Artesian Zone. Here, the highest rainfall totals occurred in central to eastern Bexar County where between 5 and 7 inches was recorded; Central and western Medina County also recorded between 5 and 6 inches. Altogether, the Artesian Zone from Hays westward to Kinney County received upward of between 3 and 5 inches. In the areas that contribute to the Edwards Aquifer, a large portion of the Recharge Zone received much needed rainfall. The most rainfall recorded occurred from central to eastern Uvalde all the way to southern Hays County where between 4 and 6 inches was recorded. The most rainfall recorded in the Contributing Zone occurred in the area of central Bandera & northern Medina County where between 4 and 6 inches was recorded. Elsewhere, between 2 and 4 inches was recorded northward of the Contributing Zone.

Rain Evaluation – Precipitation Gauge Data – January 2017

In January 2017, the western areas received below average rainfall while the eastern portion received amounts slightly above average. The January 2017 maximum monthly total rainfall amounts in the EAA's gauges ranged from 0.41 to 3.64 inches. The highest reported 24-hour rainfall event from the EAA's precipitation gauge network in January, by county, were as follows:

Bandera, 1.84 inches; Bexar, 1.68 inches; Blanco, 1.14 inches; Comal, 2.26 inches; Edwards, 1.35 inches; Hays, 1.62 inches; Kendall, 1.44 inches; Kinney, 2.38 inches; Medina, 1.26 inches; Real, 1.20 inches; and Uvalde County, 1.98 inches. The highest 24-hour rain event recorded in the region was 2.38 inches of rain that occurred on January 16th at a gauge located on the south side of US-90, between Schubach Lane and the intersection of FM1572 and US-90 in Kinney County.

Evaluation of January 2017 Aquifer Levels and Spring Discharge

Rainfall amounts were variable across the region with the eastern area slightly above average and the western region below average. Aquifer response to pumping and rainfall were mixed. The San Antonio Pool Index Well (J-17) *decreased* 0.5 feet to 684.9 feet above mean sea level (msl) while the City of Hondo Well *decreased* 0.8 feet to 725.6 feet msl. The Uvalde Pool Well (J-27), however, *increased* 0.6 feet to 875.0 feet msl.

The January daily average springflow for Comal Springs, *increased* 2 cubic feet per second (cfs) to 394 cfs, which is 92 cfs *above* the January monthly average discharge of 302 cfs. The daily average springflow for San Marcos Springs *increased* 9 cfs to 235 cfs, which is 62 cfs *above* the monthly average discharge of 173 cfs for January. 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 – February 2017

The official daily high water level for the Uvalde Pool Index Well (J-27) was 875.3 ft. msl on February 8, 2017, which is 7.4 ft. *above* the J-27 February monthly average of 867.9 ft. msl. The daily high water level at the San Antonio Pool Index Well (J-17) was 684.0 ft. msl on February 8, 2017; 15.1 ft. *above* the J-17 February monthly average of 668.9 ft. msl. The daily average discharge at Comal Springs on February 7, 2017, was reported to be 402 cfs, 98 cfs *above* the February average of 304 cfs while the daily average discharge at San Marcos Springs on February 7, 2017 was reported to be 239 cfs, 64 cfs *above* the February average of 175 cfs. Please note that the discharge values are estimates and may be adjusted up or down as more direct flow measurements are obtained.

Summary of Current Regional Aquifer Conditions – February 2017

As forecast by the National Weather Service (NWS), the last quarter of 2016 had warmer than normal temperatures with Texas as the twentieth warmest on record. However, at or above normal precipitation allowed the Edwards Aquifer region to remain above Critical Period Management (CPM) thresholds. The U.S. Department of Agriculture - U.S. Drought Monitor Index indicated that abnormally dry to slightly severe drought conditions still exist in the Cooke-Grayson County area and in the Brownsville-Port Lavaca area along the Gulf Coast in the State of Texas. As a result, in its entirety, only about 10% of Texas is experiencing some form of seasonal or short-term drought condition.

The Climate Prediction Center (CPC) reported that, “La Niña continued during December, with negative sea surface temperature (SST) anomalies continuing across the central and eastern equatorial Pacific.” As such, with the current La Niña Advisory (issued in Nov. 2016), “a transition to ENSO-neutral is expected to occur by February 2017, with ENSO-neutral…continuing through the first half of 2017.” The US Seasonal Drought Outlook shows drought conditions virtually absent in most areas of Texas while development and persistence is likely in extreme southern Texas from the Brownsville area along the Gulf Coast to Corpus Christi. The NWS - Climate Prediction Center’s Long Range Outlook continues to forecast above normal temperatures, but equal chances of above, below, or normal precipitation for south central Texas into April 2017.