

Figure 1. Summer 2021 (June-August) preliminary rainfall for the Rio Grande Valley/Deep South Texas and brush country region. Annotations include data from NWS, FAA, CoCoRaHS, and trusted mesonet locations.



Above: Photos from July 9 from in/near Brownsville, following pockets of more than ten inches of rainfall in four days. Heaviest rain fell on July 9th in this area.

Rio Grande Valley Summer 2021 Weather Story: Wet Starts to June and July; Hot and Dry Conditions Return in August

For the fourth summer in a row, multi-day torrential rainfall events were sufficient to push seasonal rainfall above thirty-year averages for a good portion of the heavily populated Lower Rio Grande Valley, which extends from the McAllen metropolitan area east to Harlingen and Brownsville. The four-day period from July 6-9, 2021, [joined July 25-27, 2020 \(Hurricane Hanna\)](#), [June 24, 2019](#) (mesoscale thunderstorm system), and [June 18-22, 2018](#) (The Great Flood of June, 2018) in producing 1/50 ("50 year", or 2% probability) or lower events. The

relative frequency of multi-million-dollar flood damage events has prompted communities across the LRGV to develop flood mitigation strategies through grant funds supplied by the Texas Water Development Board and other sources. One example from this past August was the formation of the [Hidalgo County Municipal Drainage Committee](#), comprised of the cities that make up the McAllen metropolitan region (McAllen, Edinburg, Pharr, and Mission). The purpose of the Committee is to improve the ability to flow water through the County's highly interconnected drainage canals, ditches, pipes, and pumps. Similar discussions have occurred in Cameron and Willacy County in recent months.

The periodic heavy rainfall, which also impacted the first few days of June, provided sufficient and initially deep layer soil moisture to provide welcome assistance to summer crops, finishing off the last of drought and dryness across the region that had been sharply reduced in [May](#). Unlike 2020, when late July's [Hanna wiped out much of the Valley's cotton crop](#), the end of torrential rainfall in early July 2021, followed by seasonable temperatures and minimal rainfall, allowed a nearly full complement of a "normal" season's cotton output to close out summer.

For the predominance of Rio Grande Valley locations with sufficient records, summer 2021 ranked among the top fifteen wettest on record, with most locations falling within the top ten wettest. In general, 2008 – the year of a record wet July bookended by a [wet start to the month](#) and a wet finish from [Hurricane Dolly](#), followed by periodic wet periods in August – was common year that remained number one.

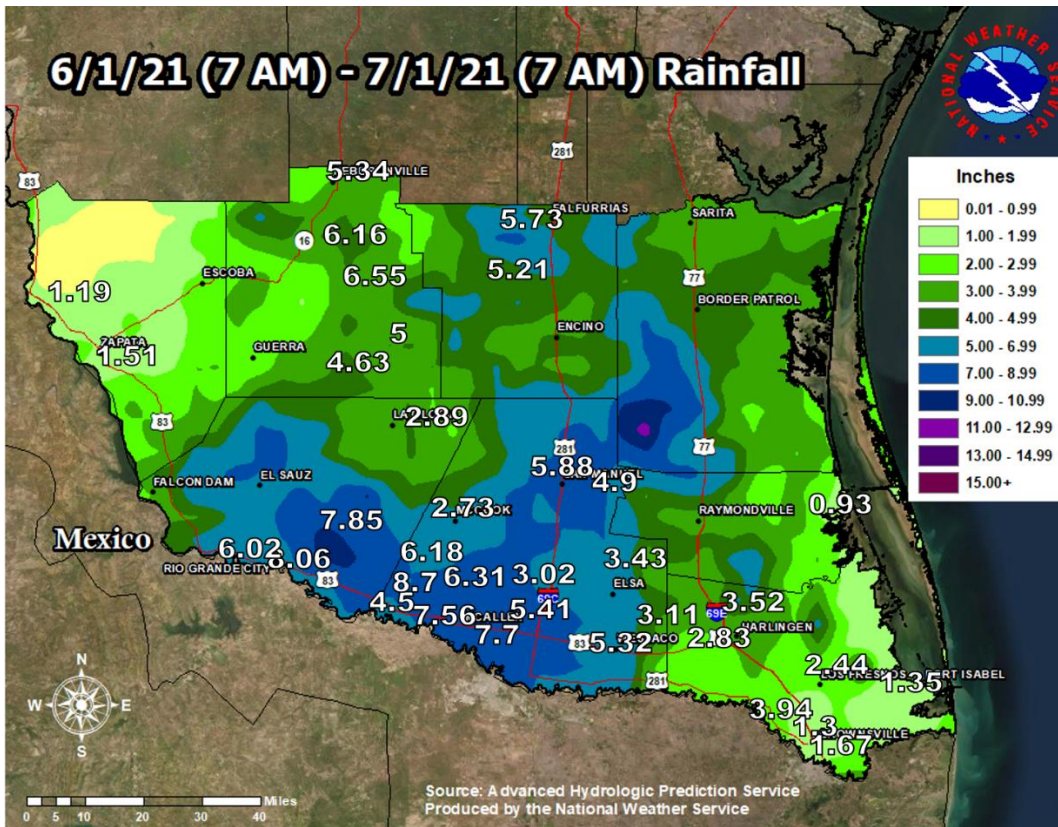


Figure 2. Preliminary June 2021 rainfall, with annotation for a mix of NWS, FAA, CoCoRaHS, and Mesonet observations.

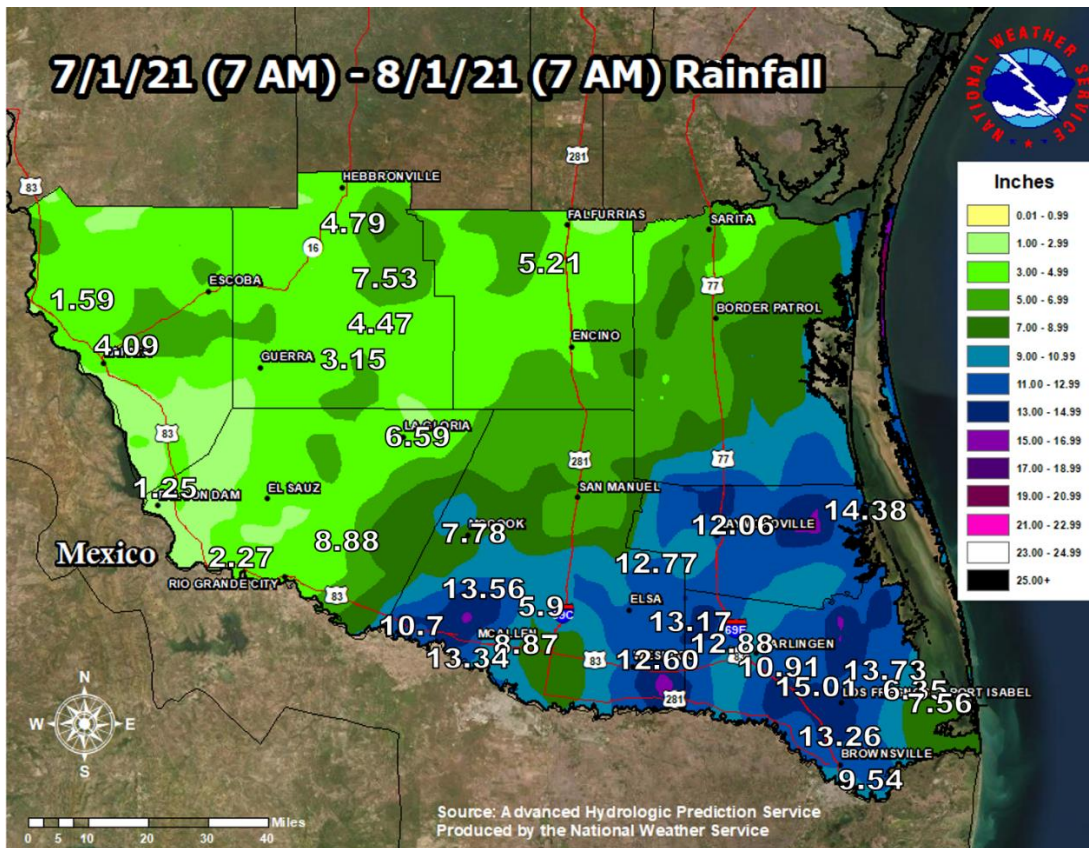


Figure 3. Same as Figure 2, except for July 2021.

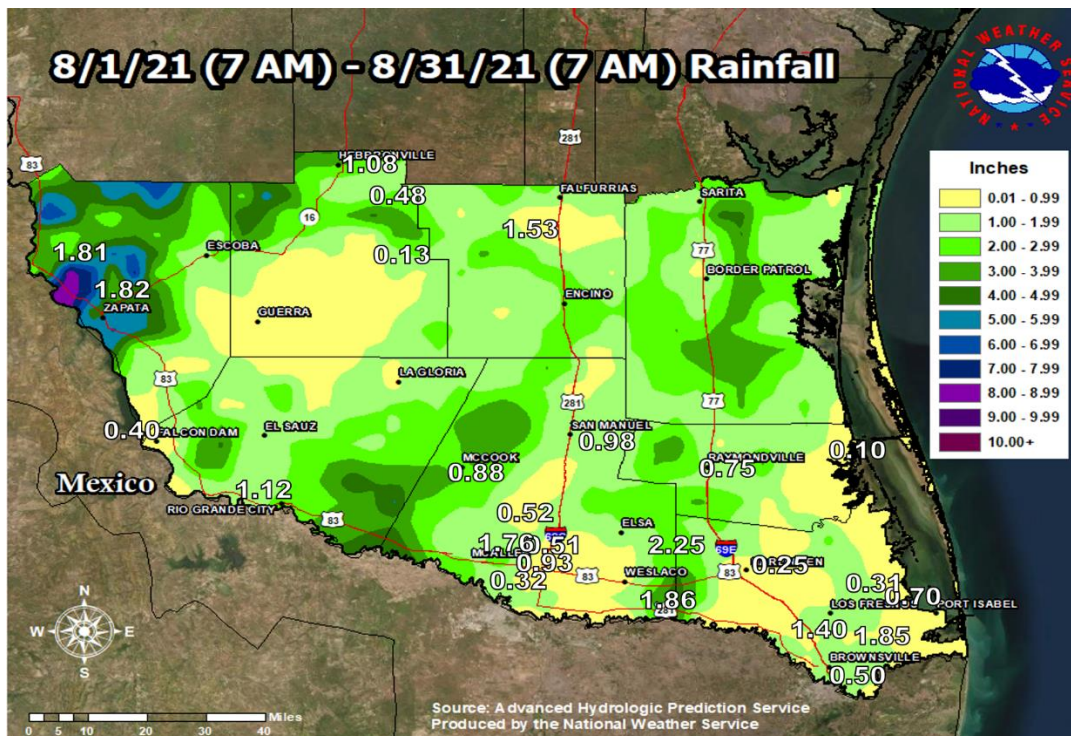


Figure 4. Same as Figs. 1-3, except for August 2021.

Temperature trends were dictated by the rain, as well as the overall atmospheric steering pattern (Figure 5). For summer 2021, the mean position of the ridge of high pressure, often known as “La Canícula” given its dominance during the July through mid-August period when Sirius (the “dog star”) rises with the sun, shifted hundreds to more than a thousand miles north and west of its normal position (Figure 6), which is typically

centered from the Permian Basin through southeast New Mexico and into Coahuila and Chihuahua States, Mexico.

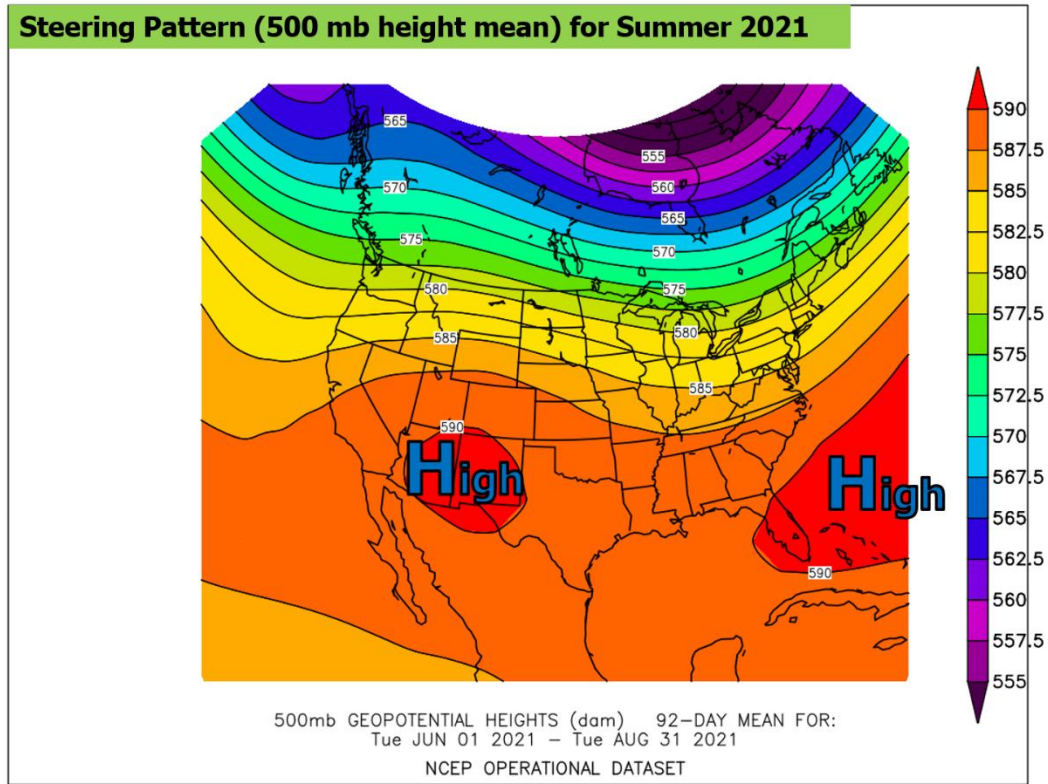


Figure 5. Average summer 2021 steering pattern (500 mb, or approximately 18,000 feet above ground level), across the United States and southern Canada.

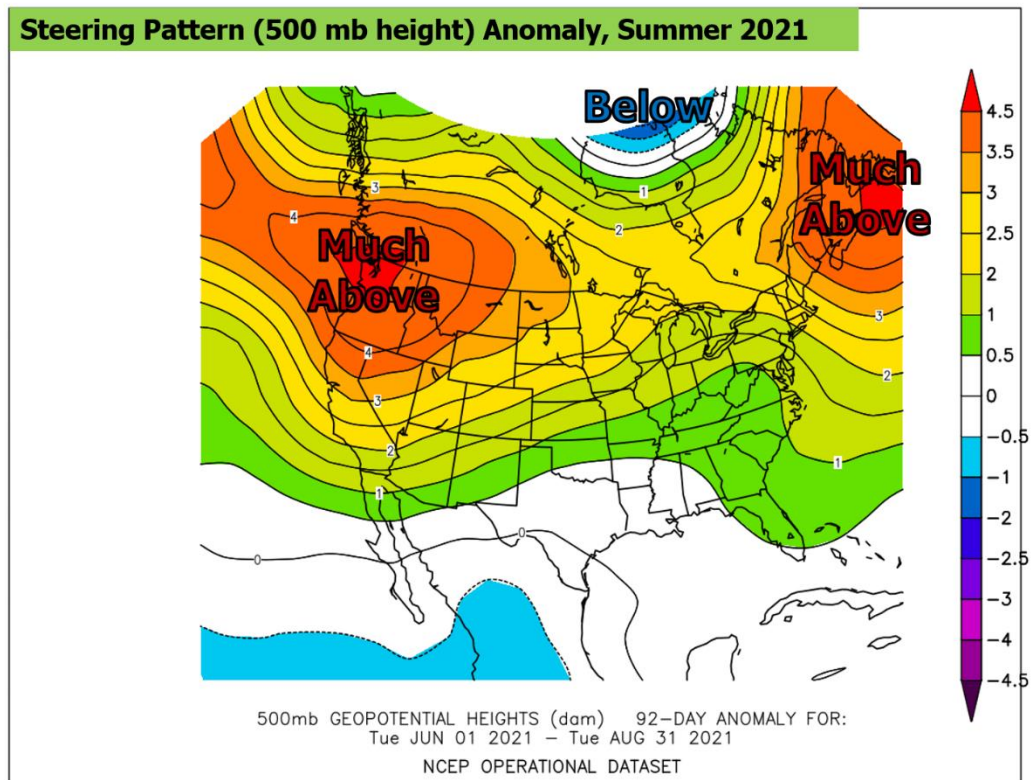


Figure 6. Steering pattern (500 mb height) anomaly for summer, 2021. Note the displacement of the high pressure anomaly farther north and west than in recent years, and the strength (Much Above) of said anomaly. The area of much above 500 mb heights coincided with a record hot summer across the Pacific Northwest/Cascadia region of the U.S. and Canada.

That position allowed for two variables to influence temperatures: First, the series of weak easterly waves (Figure 7) that produced five consecutive soaking days in early July, which on their own reduced daytime temperatures for the next few weeks due to evapotranspiration; Second, a general weakness between the western ridge and the Bermuda ridge, which kept the atmosphere from heating up sufficiently to push temperatures toward or above the century mark. In fact, July's average temperatures for Harlingen and McAllen fell on the "cool" side of the ledger, with McAllen ranking 16th lowest (since 1941) and Harlingen 55th lowest (since 1911).

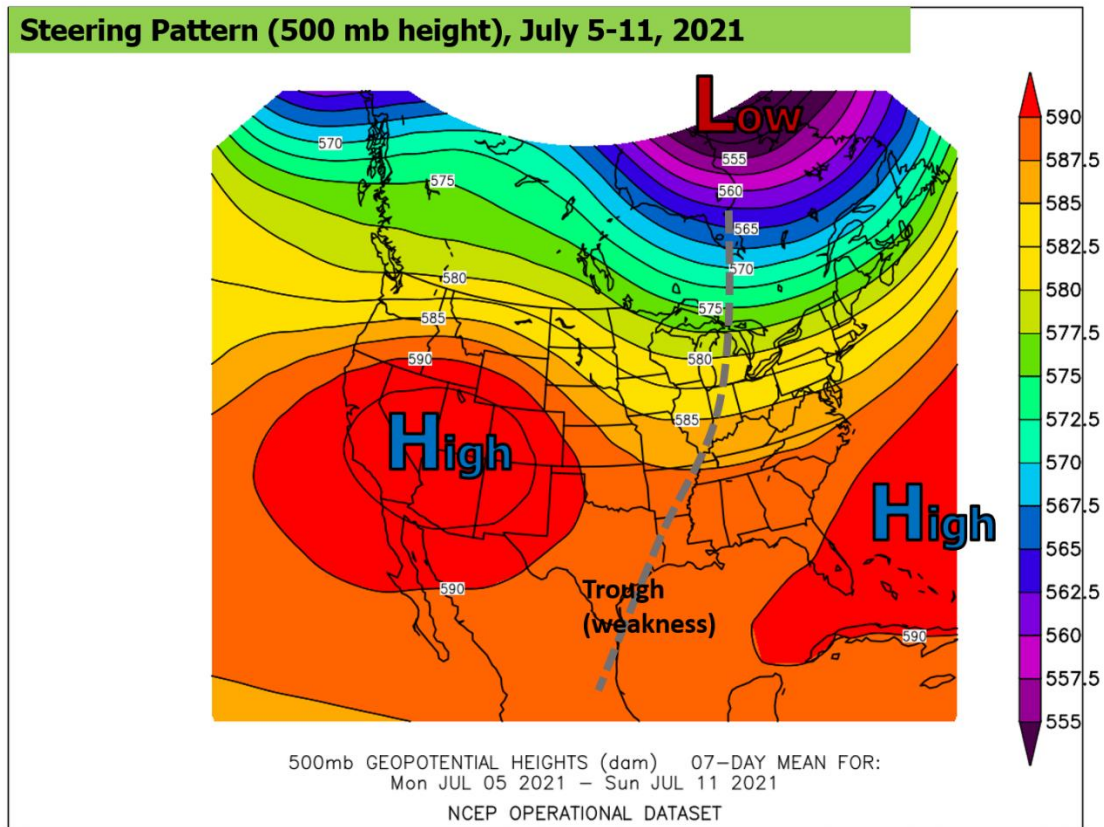
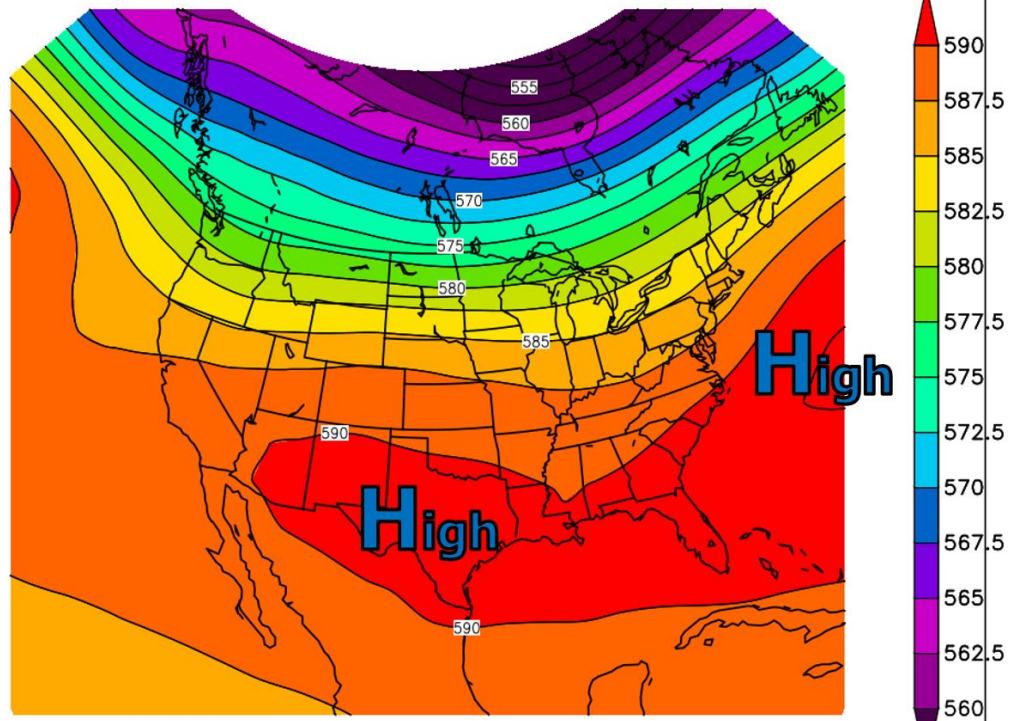


Figure 7. Mean steering pattern (500 mb, or approximately 18,000 feet above ground level) for July 5-11, 2021. As was common during parts of the summer, the 500 mb ridges shifted west, with the "La Canicula" ridge centered over the U.S. Four Corners region and the Bermuda ridge extending into the eastern Gulf. A broad trough of low pressure extended from Hudson Bay southward to Arkansas; easterly waves fed the southern extent of the trough along the Texas coast to produce copious rainfall from deep tropical moisture.

By August, a broad ridge stretched from the western Atlantic (west of Bermuda) through Texas (Figure 8), which allowed for gradual drying and ultimately hotter temperatures by afternoon and sultry values each morning. The broad ridge also helped steer Hurricane Grace well south of the Valley, into Veracruz (state) Mexico on August 21st. Temperature recovery from late July through the end of August ultimately moved summer into the top 25 percent warmest for Brownsville and Harlingen. McAllen, which received the highest local area rainfall totals in the Valley, finished in among the top half of cooler summers. In McAllen, the additional rainfall, combined with the less-hot atmosphere compared with most years of the recent decade, tilted the average below the median year (40th ranked).

Steering Pattern (500 mb height), August 2021



500mb GEOPOTENTIAL HEIGHTS (dam) 31-DAY MEAN FOR:
Sun AUG 01 2021 - Tue AUG 31 2021
NCEP OPERATIONAL DATASET

Figure 8. Mean steering pattern (500 mb heights, or around 18,000 feet above ground level) for August 2021. The high pressure ridge returned to Texas and extended through Florida out to Bermuda. The ridge both locked in drier and hotter weather for the Rio Grande Valley and helped steer Hurricane Grace into Veracruz in late August.

Table 1: Rainfall, Rankings, and Comparisons for the Rio Grande Valley – Summer 2021

Location	2021 Rainfall	Rank	Departure from 1991-2020 Average	Record/Prior Record (year)
Brownsville (since 1878)	11.71	21	+4.71	21.25 (1880)
Harlingen (since 1911)	14.35	7	+7.47	21.37 (2008)
McAllen/Miller (since 1961)	16.89	2	+10	19.72 (1975)
McAllen/Coop (since 1941)	19.75	1	+13.63	---
McCook (since 1942)	11.89	7	+6.55	19.09 (2008)
Port Mansfield (since 1958)	15.41	2	+9.87	25.69 (2007)
Raymondville (since 1911*)	14.78	6*	+7.64	17.47 (2008)
Rio Grande City (since 1893*)	9.81	13*	+3.67	23.81 (2007)
Santa Rosa (since 1987)	18.53	3	+11.88	21.27 (2020)
Weslaco 2 E (since 1914*)	18.22	2	+11.32	19.24 (2008)

*Missing several to many years of summer records.

Table 2: 2021 Summer and June-August Average Temperatures and Rankings for the Rio Grande Valley

Location	Month/Season	2021 Observed	Rank	Prior Record (year)
Brownsville (since 1878)	Summer	85.3	23	87.9 (2019)
	June	84.1	38	87.3 (1998)
	July	84.5	57	87.5 (2018)
	August	87.1	5	89.3 (2019)
Harlingen (since 1911)	Summer	85.2	33	88.0 (2019)
	June	84.2	38	88.2 (1998)
	July	84.4	65	88.7 (2016)
	August	86.9	19	89.7 (2019)
McAllen (since 1941)	Summer	85.1	49	90.8 (2009)
	June	84	49	90.3 (1998)
	July	84.3	66	92.8 (2009)
	August	87.1	30	91.5 (2019)