Autumn 2021 in the Lower Rio Grande Valley: Warm, Wet…and Dry

October, November Rains Make Up September Deficits for Many

Season ranks among top ten warmest, all-time

Autumn 2021 Temperature and Rainfall Across the Rio Grande Valley

Location	Avg. Temp	Rank (since)	Record (year)	Total Rainfall	Rank (since)	Record (year)
Brownsville	78.5	**2 (1878)**	79.6 (2016)	17.65	**14 (1878)**	31.60 (1886)
Harlingen	77.3	**8 (1912)**	79.6 (2016)	14.62	**17 (1912)**	24.55 (1933)
McAllen	78.4	**9 (1941)**	82.4 (2016)	5.79	45 (1941)	18.82 (2003)
Edinburg	77.4	**2 (2000)**	78.1 (2012)	6.97	11 (2000)	18.52 (2003)
McCook	76.7	**8 (1942)**	78.5 (2016)	8.90	**16 (1942)**	24.90 (1967)
Rio Grande City	77.6	**6 (1897*)**	80.7 (1901)	3.18	**20th driest**	0.47 (1938)

Top Ten Warmest | Top Twenty Driest | Comparison to Wet Record

Top Twenty Wettest | Comparison to Dry Record

Autumn 2021 continued a trend that has dominated much of the 21st Century: Much warmer than long-term average temperatures – and a continuation of summer-like temperatures well into the 10th and even parts of the 11th month of the calendar year. Most primary locations across the Lower Rio Grande Valley reached top ten warmest status; for Brownsville and McAllen, this was the sixth time in the past decade that autumn temperatures ranked in the top ten. A near-record warm start to December will likely ensure that 2021 ranks in the higher tier of all-time temperatures; as of December 8th, Brownsville sat at 18th warmest (144 years on record); Harlingen sat at 23rd warmest (110 years), and McAllen sat at 29th warmest (81 years).

Rainfall varied across the region. In general, higher rainfall occurred along and east of Interstate 69-C (IH-69C)/US 281, from McAllen to Falfurrias to the Lower Texas coast. The lack of rainfall (with few exceptions) during the climatologically wettest month of the year (September) carried through October across the Deep South Texas Brush Country and Rio Grande Plains before November rains improved severe drought to just abnormally dry conditions. Toward the coast, a dry to very dry September was eliminated by more widespread heavy rain events in October and November. The following are brief summaries of each month in Autumn 2021.

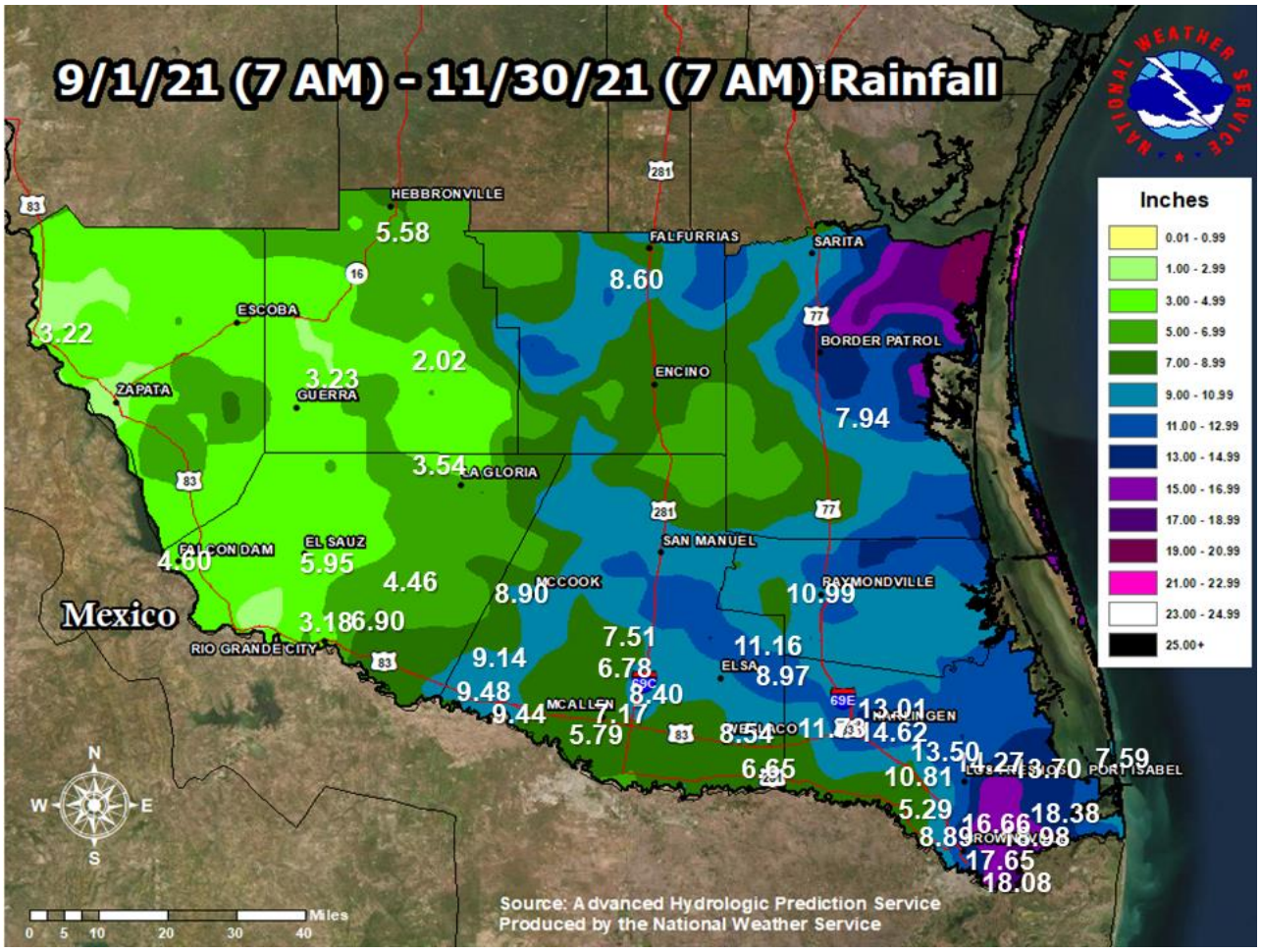

Figure 1. Annotated autumn 2021 rainfall map for the Lower Rio Grande Valley/Deep S. Texas region. Observations are a combination of CoCoRaHS, Automated Surface Observation Stations (ASOS), Automated Weather Observation Stations (AWOS), and Texas Mesonet stations.

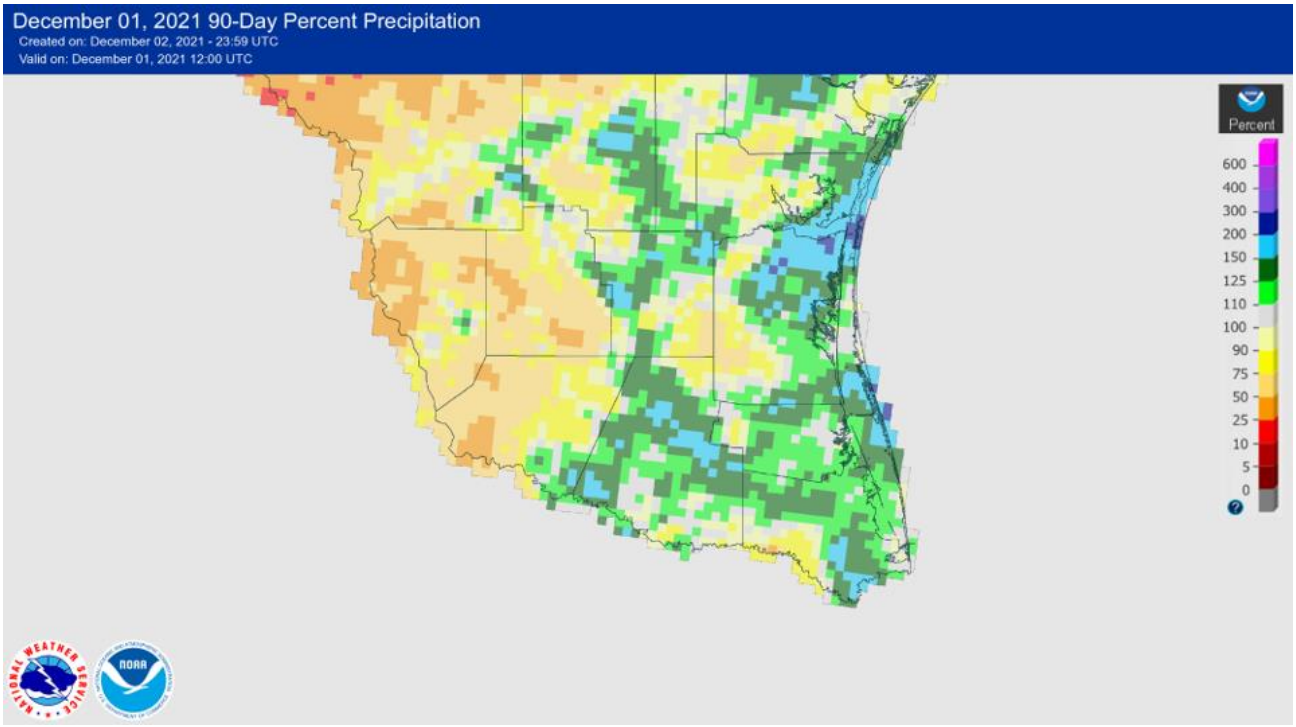

Figure 2. The "west", not the best: Starr, Jim Hogg, and Zapata County were generally dry, while Hidalgo and Brooks County to the Lower Texas Coast were generally wet in autumn 2021.

September

The month began with little fanfare, other than searing heat and no rainfall relief for the first week of the month. The month is traditionally known for several tropical-type events, from tropical waves to full blown hurricanes. 2021 met the criteria, but only briefly, as a sheared-out Tropical Storm Nicholas with a very tight center "waved" to the Lower Texas coast early on September 13th. Nicholas' very small center passed a mere 30 miles east of South Padre Island; outer rain bands dropped a welcome 1 to 2.5" along and east of IH-69C but only sprinkles across most of Jim Hogg and Starr County. Additional rains of 0.5 to 1" fell along IH-69C that afternoon, ending the threat for an early start of drought by mid-month. Relief was short-lived, as little to no rain fell for the rest of the month, with two local exceptions: Brownsville during the morning of September 30th (2.33") and Brooks County that afternoon (radar estimated 3 to 5" on the Brush Country region).

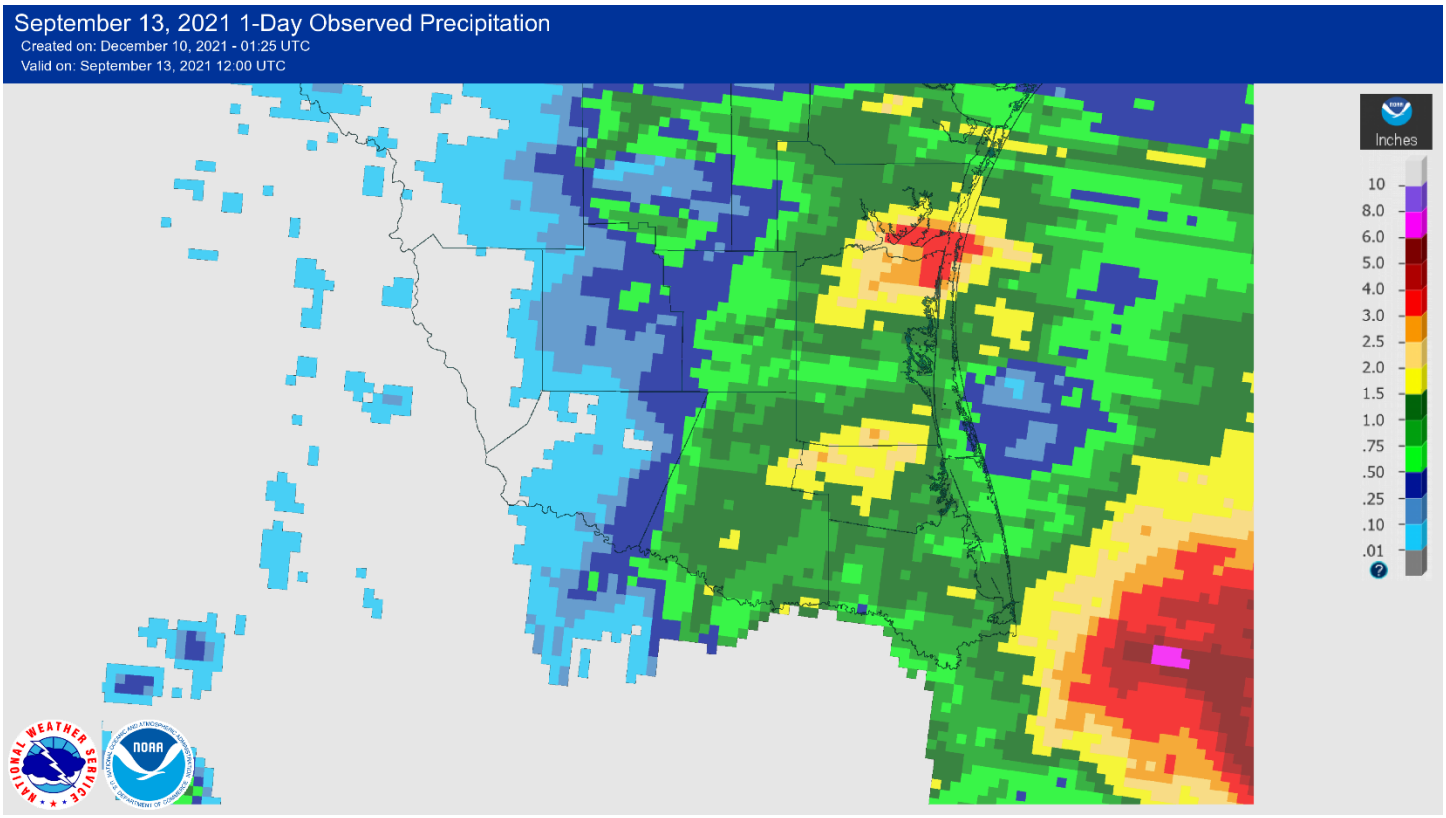

Figure 3. Rainfall associated with Tropical Storm Nicholas and the associated shear axis. Note the core of heavy rainfall, estimated at 8" or more, with the core of Nicholas 30 miles east of South Padre Island.

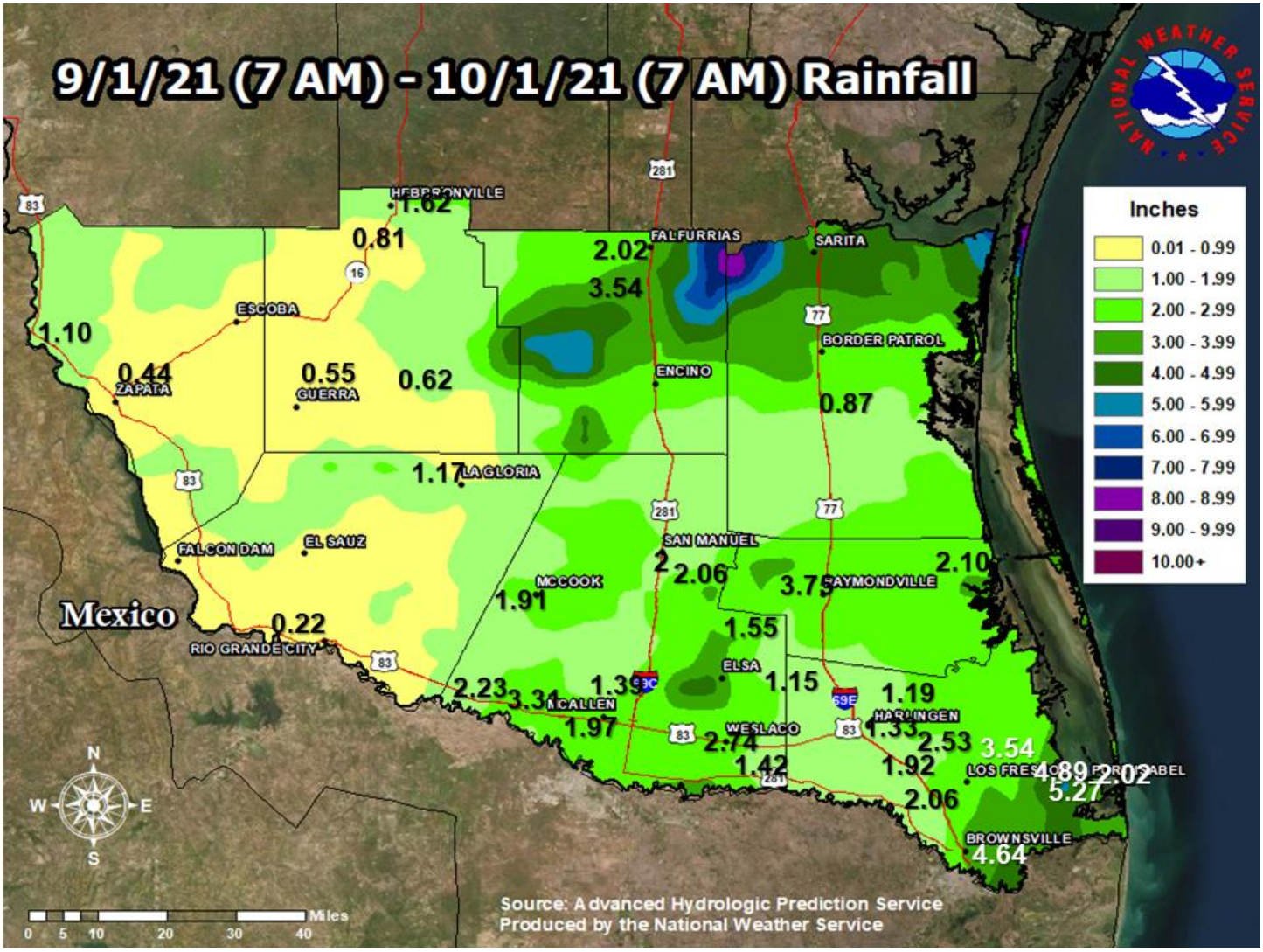

Figure 4. Annotated September 2021 rainfall map for the Lower Rio Grande Valley/Deep S. Texas region. Observations are a combination of CoCoRaHS, Automated Surface Observation Stations (ASOS), Automated Weather Observation Stations (AWOS), and Texas Mesonet stations.

October

Figure 5. Photo of resaca/retention area over spilling banks onto Vermillion Ave. in east Brownsville, closing the road, on October 1-2, 2021. Location was very close to peak rainfall from CoCoRaHS observer for the event (10.72 daily total).

In a single day, the lack of "typical" monthly rainfall expected in September was made up for many times over on the 1st. Deep tropical moisture, multiple convective boundaries, and sufficient upper-level energy moving between a trough of low pressure across the U.S. Four Corners region and a subtropical ridge over the western Gulf combined to create record torrential rain and widespread flooding, generally along and east of IH-69E/US 77 from Cameron through Kenedy County. Six to more than 10" fell in multiple rain bands, culminating in a deluge estimated at 4" per hour for two hours across the east side of Brownsville during the peak of the Friday afternoon/evening commute. A CoCoRaHS observer just north of the NWS Office in east Brownsville reported 10.72" on the 1st, and a two-day total of 13.53" that included the aforementioned morning downpour on September 30th. Brownsville and Harlingen each shattered their all-time official NWS October 1st rainfall record by more than 5", and Harlingen's 7.97" was the second highest calendar day rainfall on record (since 1911), only surpassed by 9.79 inches on April 5, 1991.

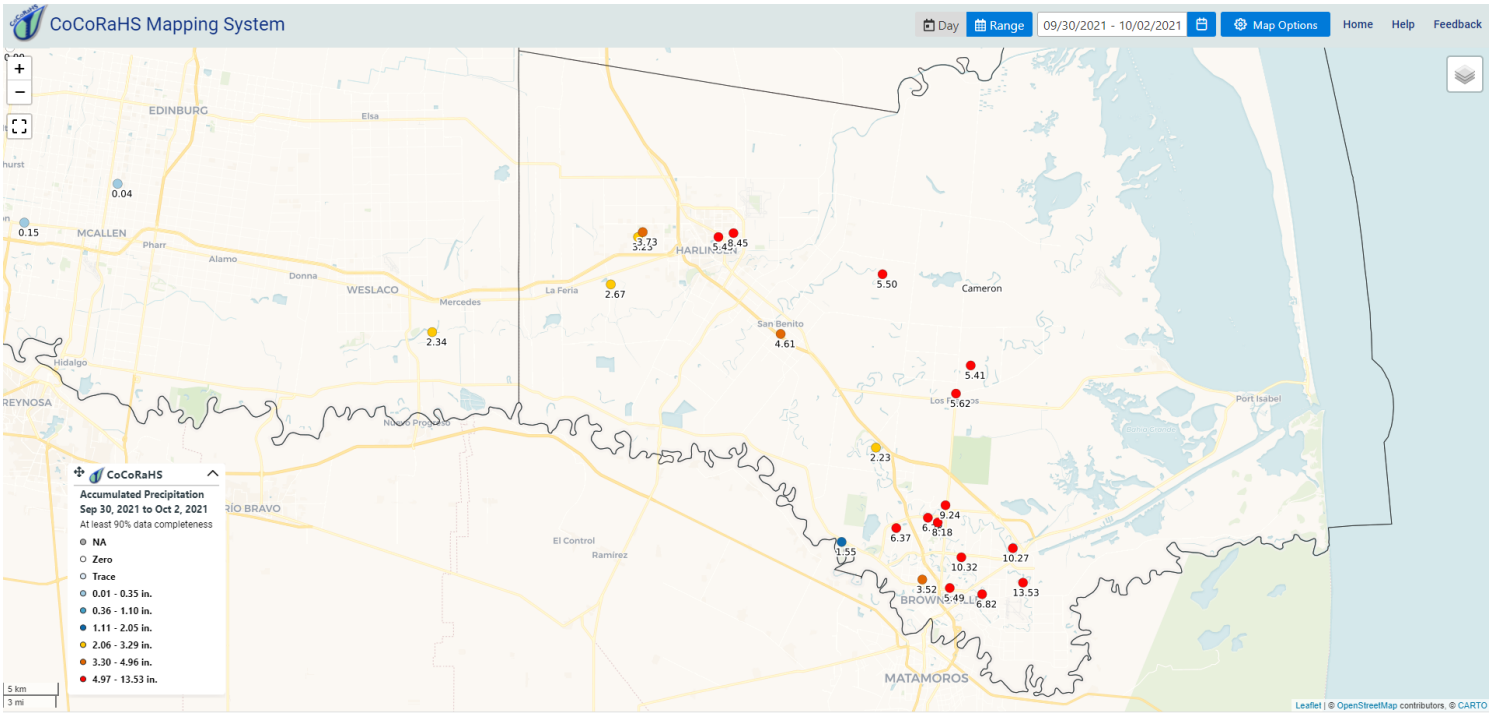

Figure 6. CoCoRaHS mapping system map of rainfall from October 1, 2021, in Cameron County.

Following the inundation (and disaster declaration) in Cameron County on the 1st, October settled in as a hot month, with the lack of rainfall from Brooks and Hidalgo County west to Zapata County pushing the month into or near the top ten *driest* October in McAllen (12th driest) and Edinburg (9th driest, but only 21 years of record). Brownsville and Harlingen, buoyed by the record-shattering daily rainfall on the 1st, ended up among the top ten wettest (Brownsville, 10th; Harlingen, 5th). Additional rains in Harlingen and Brownsville around the 15th/16th and again on the 22nd combined with the earlier rainfall was enough to keep drought conditions from returning. Such was not the case across Jim Hogg, Starr, and Zapata County, where the lack of first-half-of-autumn rainfall and the aforementioned heat worsened conditions to severe (Drought level D2) to begin November.

October 2021 Across the Rio Grande Valley: Hot, Dry...and Wet

Location	Avg. Temp	Rank (since)	Record (year)	Total Rainfall	Rank (since)	Record (year)
Brownsville	80.1	**4 (1878)**	80.4 (2004)	9.17	**10 (1878)**	17.12 (1958)
Harlingen	78.6	**8 (1912)**	80.9 (2004)	9.35	**5 (1912)**	11.09 (2003)
McAllen	80.5	**4 (1941)**	82.9 (2016)	0.29	**67 (12th driest) (1941)**	12.04 (1958)
Edinburg	79.5	**3 (2000)**	80.7 (2016)	1.04	**16 (9th driest)**	6.35 (2002)
McCook	78.4	**6 (1942)**	81.1 (2004)	3.36	21 (1942)	10.00 (2003)
Rio Grande City	79.5	**5 (1897*)**	82.3 (1901)	Incomplete	N/A	9.20 (2003)

Top Ten Warmest Top Twenty Wettest Top Twenty Driest

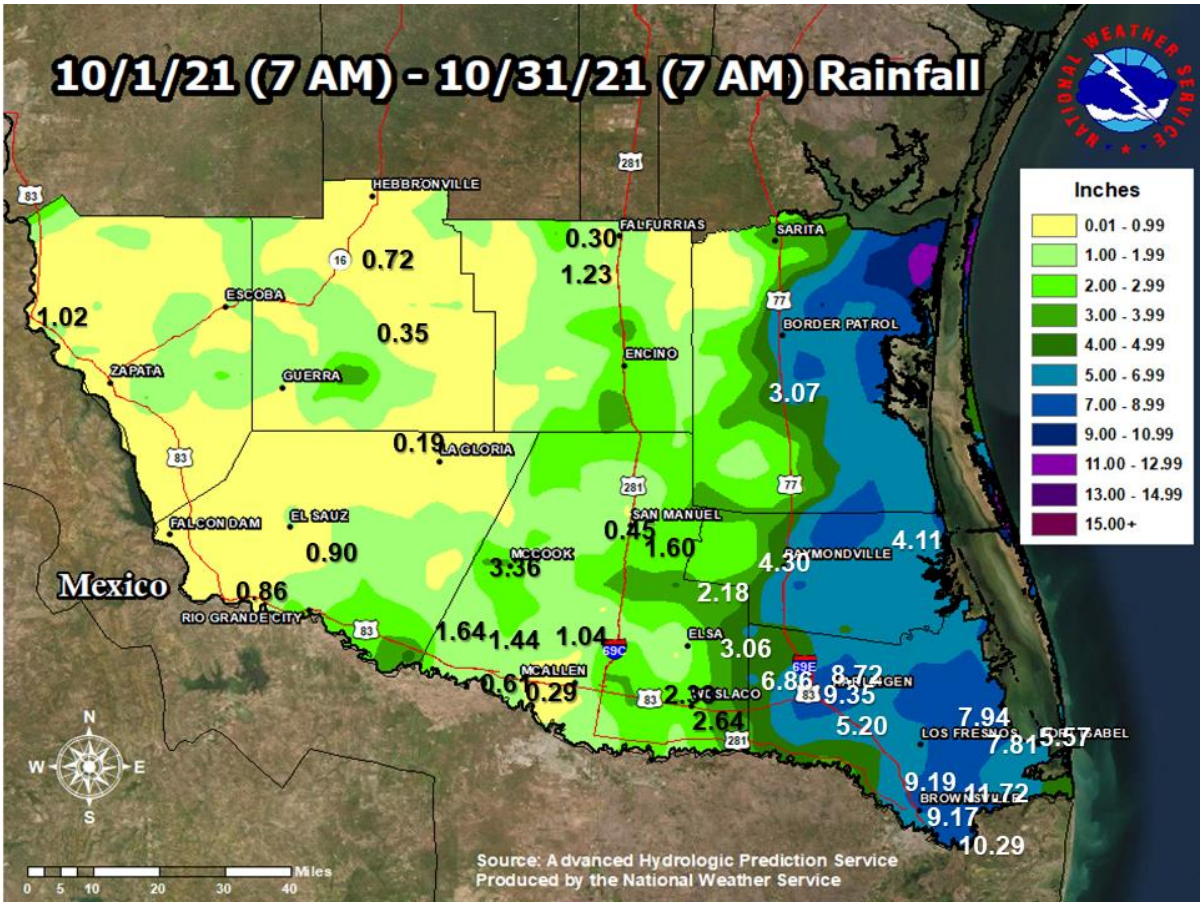

Figure 7. Annotated October 2021 rainfall map for the Lower Rio Grande Valley/Deep S. Texas region. Observations are a combination of CoCoRaHS, Automated Surface Observation Stations (ASOS), Automated Weather Observation Stations (AWOS), and Texas Mesonet stations.

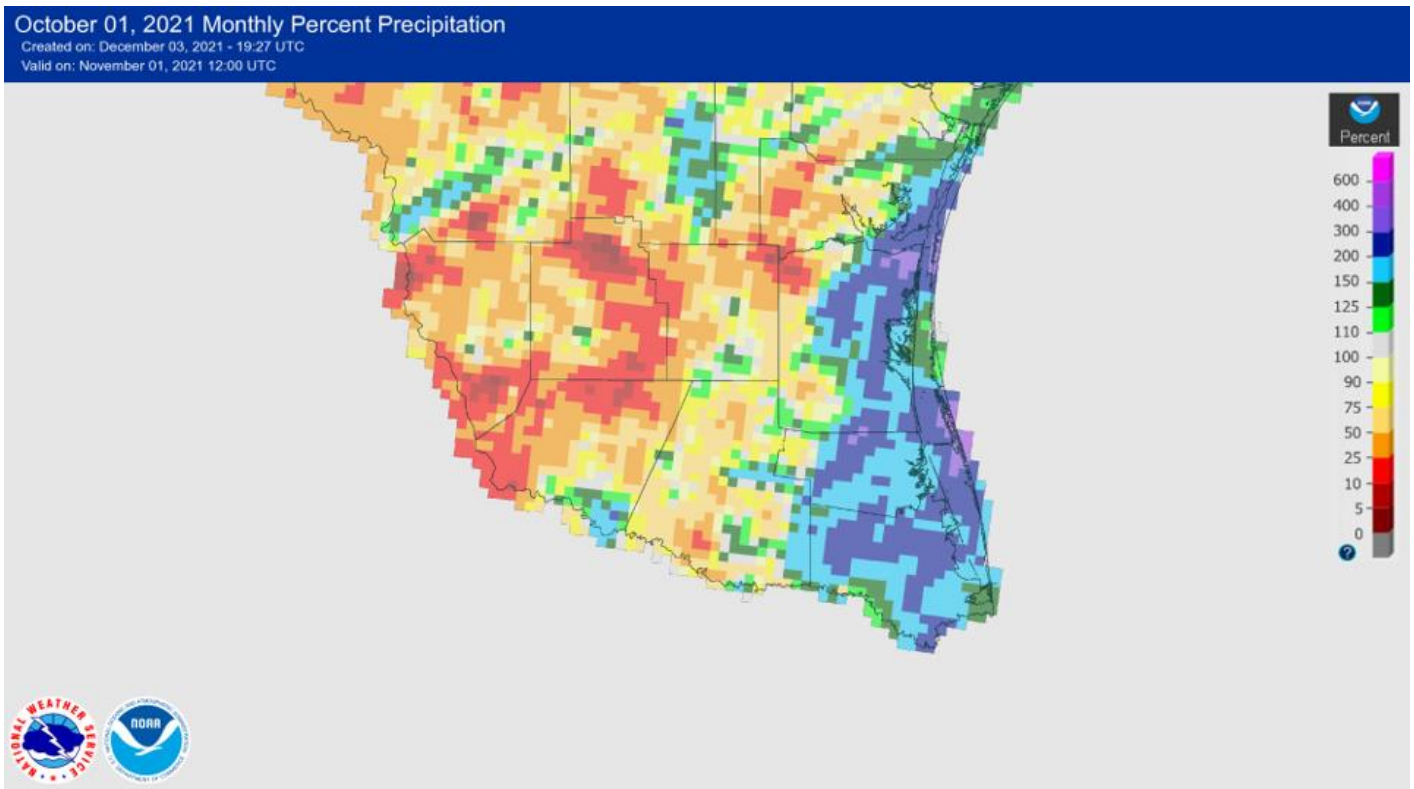

Figure 8. Percent of monthly rainfall, October 2021.

November

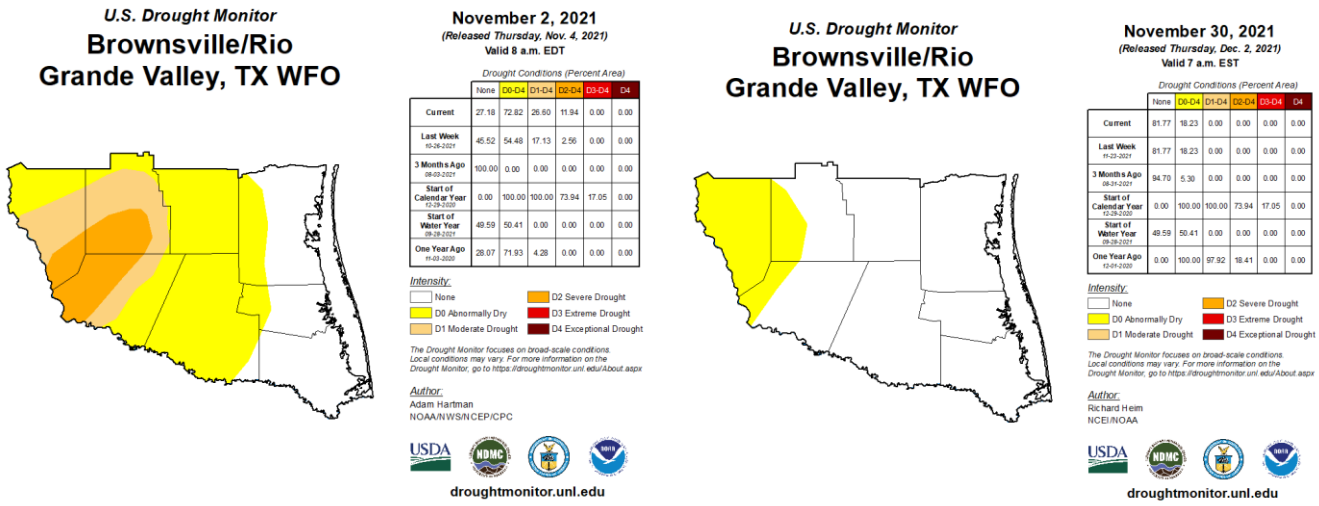

Figure 9. Drought conditions on November 2 (left) and November 30 (right).

Autumn's first significant cold front rolled across the Lower Rio Grande Valley on November 4th, accompanied by fairly widespread clusters of showers and thunderstorms including northern Jim Hogg, much of Zapata, and a large swath of northern Hidalgo County. Pockets of 3 to 4 inches of rain in areas that desperately needed it would begin to improve drought conditions across these areas, as temperatures fell into the 50s and lower 60s behind the front. Temperatures quickly rebounded by the 7th, with a stretch of above average temperatures until the next "wet" front on November 18th, when rainfall of 1.5 to 3" fell in stripes from the Rio Grande east of Brownsville through central Hidalgo County/eastern Starr, northward through Brooks County, with heaviest rains (3.49") falling just east of Brownsville.

The month's final cold front would bring the chilliest air of the season on Black Friday, preceded by more helpful, drought-repelling rains mainly from Brooks and Hidalgo County toward the coast on Thanksgiving Day. The multiple rain events that covered nearly all of the Lower Rio Grande Valley/Deep South Texas region in November relegated dryness to the Rio Grande Plains/Brush Country by month's end. In a month that typically known to be one of the driest on the calendar, November overachieved – by 150 to 600 percent of the 1991-2020 averages (Figure 11).

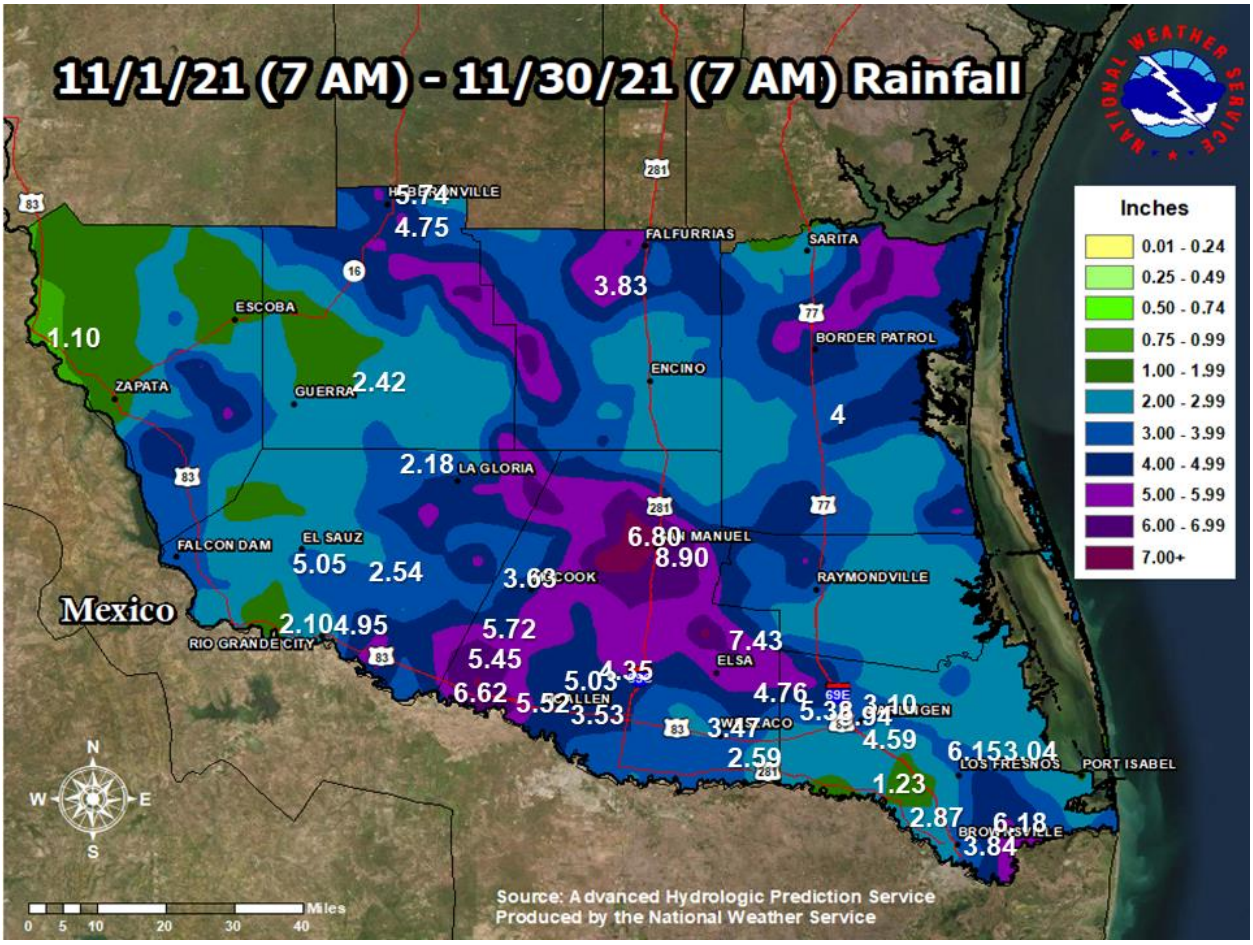

Figure 10. . Annotated November 2021 rainfall map for the Lower Rio Grande Valley/Deep S. Texas region. Observations are a combination of CoCoRaHS, Automated Surface Observation Stations (ASOS), Automated Weather Observation Stations (AWOS), and Texas Mesonet stations.

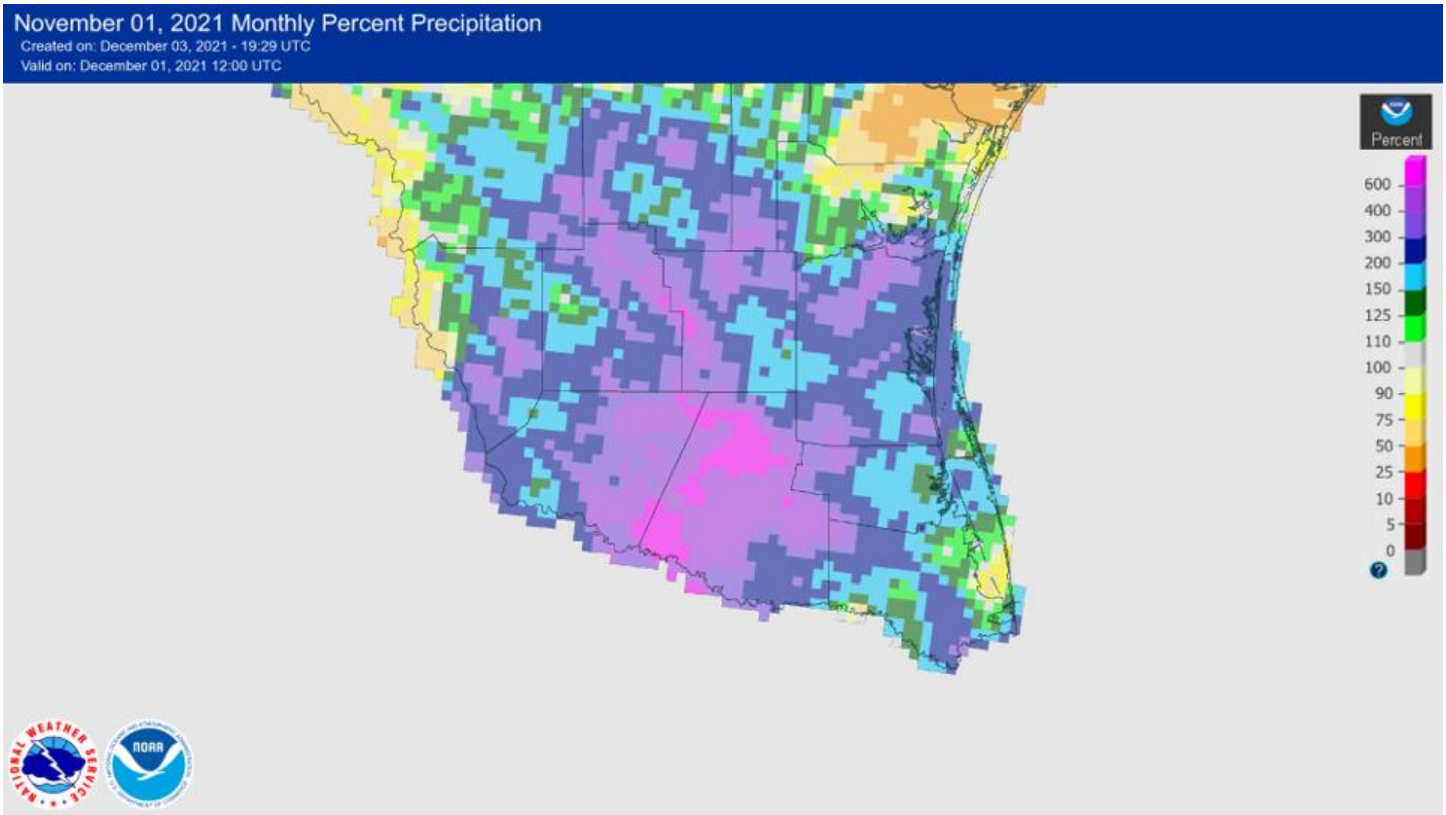

Figure 11. Percentage of average rainfall, November 2021.