

Rio Grande Valley Autumn 2023 Review

**Autumn 2023 Weather Story for the Rio Grande Valley:
Record Heat Dominates September, but the Rains Came by November**

By Barry Goldsmith
Warning Coordination Meteorologist
NWS Brownsville/Rio Grande Valley

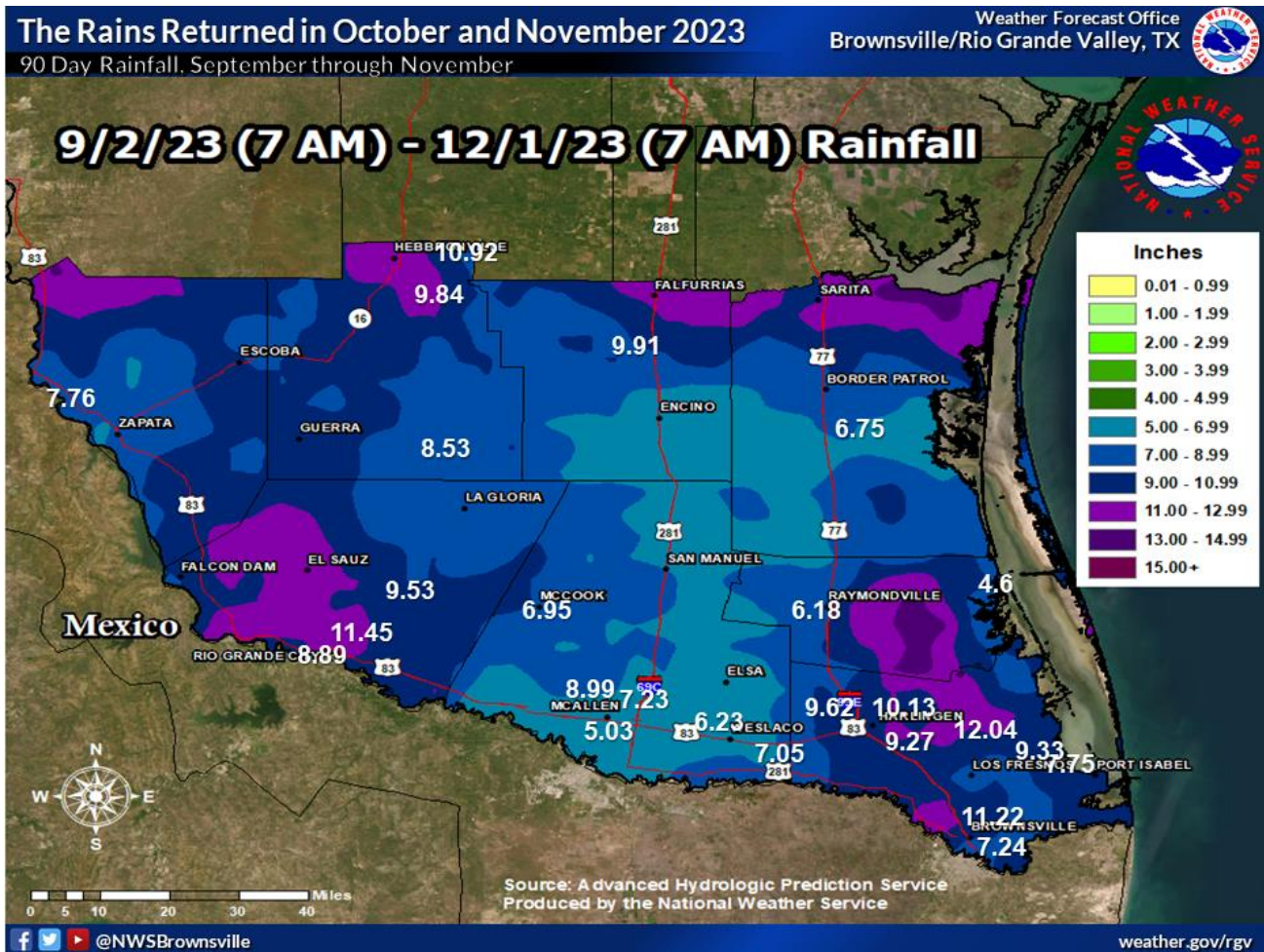


Figure 1. After a searing hot summer, which stretched into meteorological autumn (September and early October), the rains finally came in multiple events – first, thunderstorms east and west on October 5th, and more definitively, on Veterans Day Weekend (November 10-14) .

December 02, 2023 Water Year to Date (Oct. 1) Percent Precipitation

Created on: December 02, 2023 - 18:19 UTC
Valid on: December 02, 2023 12:00 UTC

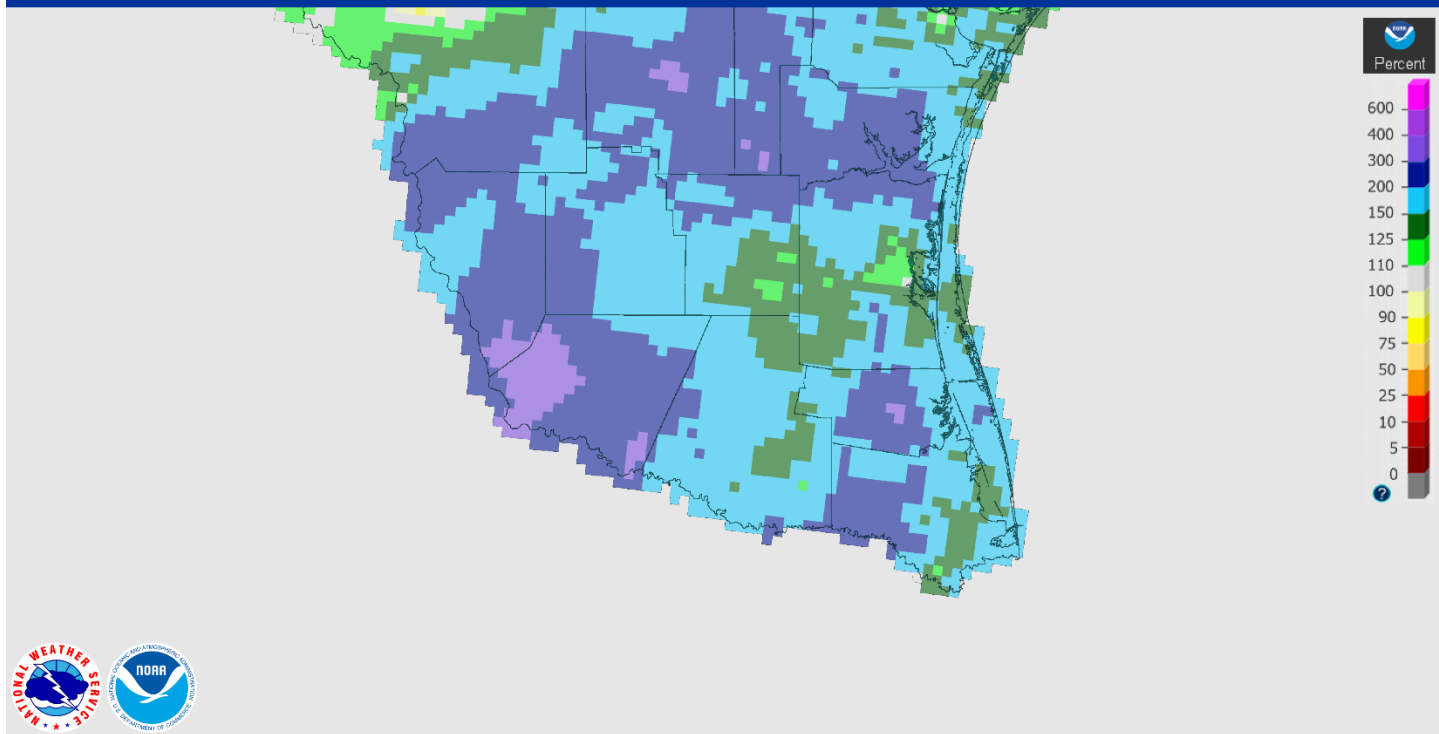
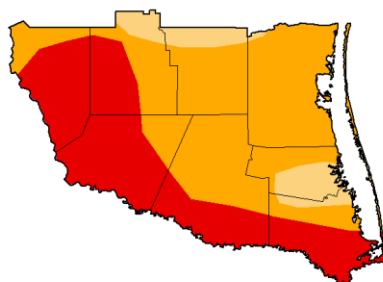


Figure 2. From the start of the water year (October 1) through the end of November, all regions of the Rio Grande Valley/Deep S. Texas Brush/Ranch country saw above average rainfall. The highest departures, two to more than four times average, occurred across the upper Valley/Rio Grande Plains, the lower Valley, and along SR-285 from Riviera to Hebbbronville.

U.S. Drought Monitor Brownsville/Rio Grande Valley, TX WFO



October 3, 2023
(Released Thursday, Oct. 5, 2023)
Valid 8 a.m. EDT

	Drought Conditions (Percent Area)					
	None	D0-D4	D1-D4	D2-C4	D3-D4	D4
Current	0.00	100.00	100.00	91.04	38.70	0.00
Last Week (9-26-2023)	0.00	100.00	100.00	91.04	38.70	0.00
3 Months Ago (7-04-2023)	39.97	60.03	0.00	0.00	0.00	0.00
Start of Calendar Year (1-01-2023)	42.76	57.24	42.53	0.00	0.00	0.00
Start of Water Year (9-26-2022)	0.00	100.00	100.00	91.04	38.70	0.00
One Year Ago (10-04-2022)	99.98	0.02	0.00	0.00	0.00	0.00

Intensity
 None (white), D0 Abnormally Dry (yellow), D1 Moderate Drought (orange), D2 Severe Drought (red), D3 Extreme Drought (dark red), D4 Exceptional Drought (black)

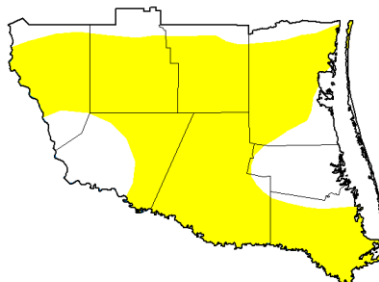
The Drought Monitor focuses on broad-scale conditions. Local conditions may vary. For more information on the Drought Monitor, go to <https://droughtmonitor.unl.edu/about.aspx>

Author:
Brad Pugh
CPC/NOAA



droughtmonitor.unl.edu

U.S. Drought Monitor Brownsville/Rio Grande Valley, TX WFO



November 28, 2023
(Released Thursday, Nov. 30, 2023)
Valid 7 a.m. EST

	Drought Conditions (Percent Area)					
	None	D0-D4	D1-D4	D2-C4	D3-D4	D4
Current	27.07	72.93	0.00	0.00	0.00	0.00
Last Week (11-21-2023)	27.07	72.93	0.00	0.00	0.00	0.00
3 Months Ago (8-29-2023)	0.00	100.00	88.38	51.11	14.82	0.00
Start of Calendar Year (1-01-2023)	42.76	57.24	42.53	0.00	0.00	0.00
Start of Water Year (9-26-2022)	0.00	100.00	100.00	91.04	38.70	0.00
One Year Ago (11-28-2022)	82.27	37.73	8.67	0.00	0.00	0.00

Intensity
 None (white), D0 Abnormally Dry (yellow), D1 Moderate Drought (orange), D2 Severe Drought (red), D3 Extreme Drought (dark red), D4 Exceptional Drought (black)

The Drought Monitor focuses on broad-scale conditions. Local conditions may vary. For more information on the Drought Monitor, go to <https://droughtmonitor.unl.edu/about.aspx>

Author:
David Simeral
Western Regional Climate Center



droughtmonitor.unl.edu

Figure 3: Severe (Level 2 of 4) to Extreme (Level 3 of 4) Drought covered the region to begin October – and had combined with record heat to severely impact livestock, late summer harvest dryland crops, and early winter-season planting by early October. A series of welcome rain events began on October 5th, and culminated in widespread 3 to 6 inches of rainfall between November 10 and 14. Additional rainfall around Thanksgiving and on the 30th was enough to remove drought, but dryness continued as much of the November rains were absorbed by thirsty top soil layers, with virtually no runoff.

Month-by-Month Summary

September picked up where the searing meteorological summer [link here] left off. In fact, locations with near-record heat from June 1 through August 31 become new records – in some cases by more than a full

degree (F) – for the commonly understood Julian (astronomical) summer (June 21 through September 22). September alone shattered heat records at most locations across the Valley, and the continuation of “La Canícula (The pattern of the “Dog Days of Summer”) through the start of October brought new September heat records to every location with available comparative data (Figure 4). That same pattern severely limited rainfall, with most areas at 10-25 percent of the monthly average (Figure 5). This was a huge factor in worsening drought impacts, as September is the wettest month of the calendar year, with 4.5 to 6” of rainfall on average. The record heat into early October allowed annual rankings (through the 5th) to soar into the top five at nearly every location, with Brownsville and Harlingen about 1 degree or more above prior year-to-date records. By the end of the searing heat (early October), new records of 100 degree days were shattered at most locations across the region (Figure 6).

Rain was limited to a single notable event on the 15th, where strong to near-severe thunderstorm clusters scraped the ranch towns in Zapata and Jim Hogg County – and more than 4.5” fell near Hebbronville. Heaviest rain, measured and estimated at 4 to 6 inches, fell along the Rio Grande just above Falcon International Reservoir and provided a brief but only temporary boost to the near-record low levels for this time on the calendar. Unfortunately, these rains missed the basin headwaters that feed Amistad International Reservoir, which continued to fall to record lows for early autumn.

September 2023 Shatters More Records
 Average Temperature Ranking and Comparisons in History

Weather Forecast Office
 Brownsville/Rio Grande Valley, TX 

Location Records Since (Year)	2023 Value (Rank)	Prior Record (Year)	Departure (Degrees F)
Brownsville (1878)	88.5 (1)	85.3 (2016)	+3.2
Harlingen (1912)	87.3 (1)	85.8 (2016)	+1.5
McAllen (1941)	89.3 (1)	88.8 (2016)	+0.5
Rio Grande City (1897)*	88.8 (1)	87.2 (1946)	+1.6
Raymondville (1913)	87.6 (1)	85.7 (1947)	+1.9
Weslaco (1914)	88.0 (1)	85.0 (1977)	+3.0**
Port Mansfield (1958)	84.9 (1)	83.5 (2005)	+1.5
Edinburg (2000)	89.2 (1)	86.3 (2011)	+2.9

Total Temperature (Day and night combined)

*Missing complete data from 1898-99, 1907-1927, 1945, and 1949

**Actual departure from prior record is likely closer to 1.5 degrees based on more than 33% of data missing from other hot Septembers between 2011 and 2020

Figure 4. September 2023 heat obliterated prior records at all locations of the Lower Rio Grande Valley, in some cases more than 3 degrees above prior monthly records!

New Records for September/Annual 100 Degree Days

Some Locations Had Two-Three Times As Many as the Prior Record!

Weather Forecast Office
Brownsville/Rio Grande Valley, TX



September

Location Records Since (Year)	September Number of 100 Degree Days	Prior Record (Year)
Brownsville (1878)	10 (1)	6 (1900)
Harlingen (1912)	16 (1)	8 (1937)
McAllen (1941)	22 (2)	23 (2016)
Rio Grande City (1897)*	21 (1-tie)	21 (1965)
Raymondville (1913)	15 (2)	17 (1920)
Weslaco (1914)	16 (1)	9 (1937)
Port Mansfield (1958)	0 (unranked)	1 (2011, 2005)
Edinburg (2000)	22 (1)	7 (2011)

Annual (through October 2)

Location Records Since (Year)	Total Number of 100 Degree Days	Prior Record (Year)
Brownsville (1878)	40 (1)	12 (2019)
Harlingen (1912)	63 (1)	42 (1943)
McAllen (1941)	95 (1)	90 (2016)
Rio Grande City (1897)*	101 (6-tie)	114 (2000)
Raymondville (1913)	66 (2)**	75 (1953)
Weslaco (1914)	64 (1)	53 (1998)
Port Mansfield (1958)	4 (1)	3 (2017)
Edinburg (2000)	90 (1)	57 (2009)

*Rio Grande City: Missing complete data from 1898-99, 1907-1927, 1945, and 1949

** Raymondville: Missing over 130 days (of 274 total days); some likely to have reached 100+

@NWSBrownsville

weather.gov/rgv

Figure 5. Most locations across the Rio Grande Valley shattered their prior annual number of 100 degree days, through October 2, 2023. McAllen fell just short of 100 for 100, reaching 97 days a few days into October 2023.

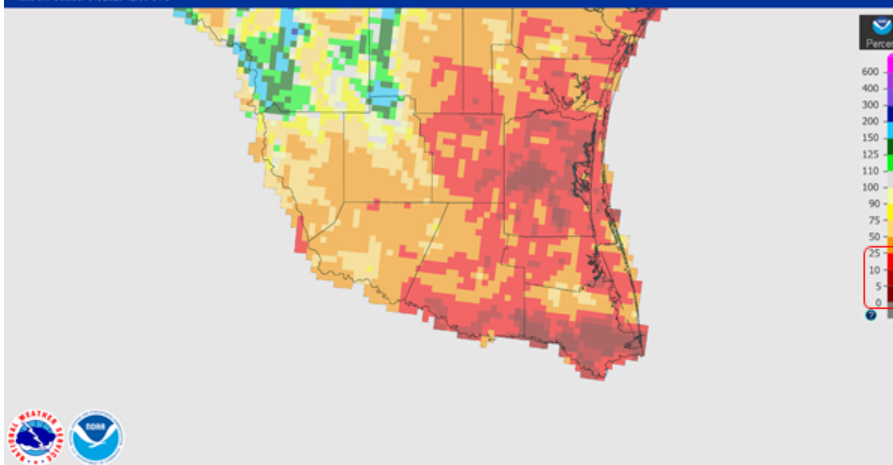
Dryness Joined the Heat in September 2023

Weather Forecast Office
Brownsville/Rio Grande Valley, TX



Percentage of Average Rainfall and Rankings

September 01, 2023 Monthly Percent Precipitation
Created on: October 02, 2023 - 22:18 UTC
Valid on: October 01, 2023 12:00 UTC



Top ten dry rankings in orange.
New record dryness in red.

Harlingen (September 16) and Rio Grande City (September 15 and 26/27) had slow moving or repeating downpours that accounted for nearly all of the month's rainfall.

Location Records Since (Year)	2023 Value (Dry Rank)	Prior Record (Year)	Departure (Inches)
Brownsville (1878)	0.02" (1)	0.07 (1959)	-0.05"
Harlingen (1912)	1.35" (13)	0.09" (1959)	+1.26"
McAllen (1941)	0.66" (10)	0" (1996)	+0.66"
Rio Grande City (1897)*	2.82" (49)	0" (1947)	+2.82"
Raymondville (1913)	0.35" (1-tie)	0.35" (1953)	0
Weslaco (1914)	0.60" (4)	0.05" (1947)	+0.55"
Port Mansfield (1958)	0.95" (8)	0.13 (2000)	+0.82"
Edinburg (1890-91, 1948-50, 2000-present)	0.33" (2)	0.00" (1890)	+0.33"

Figure 6. Most locations across the Rio Grande Valley ended up in the top ten driest Septembers, with Brownsville and Raymondville reaching or tying new dry records in 2023.

October saw the continuation of searing heat until the 5th, when an upper level disturbance and outflow boundaries combined with the sea breeze to create torrential rains of 2 to 4+ inches and local flooding in Cameron and Willacy County (Figure 7), with later evening heavy rains draping the Rio Grande Plains and upper Valley/Brush Country with 1-2 inches prior to the season's first cooling front. Additional rains October 10th dropped between 0.5 and 1.5 inches across the entire region. The season's first "big" front arrived just before Halloween, and temperatures plunged more than 30 degrees between the afternoons of the 29th and 30th. Halloween Day set new "cold maximum" temperatures for most locations in the Valley, as readings struggled into the 50s. Light rain joined the party on the 30th.

For the month, the periodic cooling helped reduce heat-departure from average, but near-record warmth through the 5th and again between the 20th and 29th was enough to maintain another month with slightly above the 1991-2020 temperature averages by about a degree.

Rainfall departures varied across the region, with above average estimates across Zapata and Starr County and a pocket of Willacy County (due to estimates near 5 inches east of the populated areas there) – but still 50 to 90 percent of average in between.

Winners and Losers: October 5th Rainfall A Mixed Bag

24-hour rainfall from 7 AM October 5 through 7 AM October 6 2023

Weather Forecast Office
Brownsville/Rio Grande Valley, TX



10/5/23 (7 AM) - 10/6/23 (7 AM) Rainfall

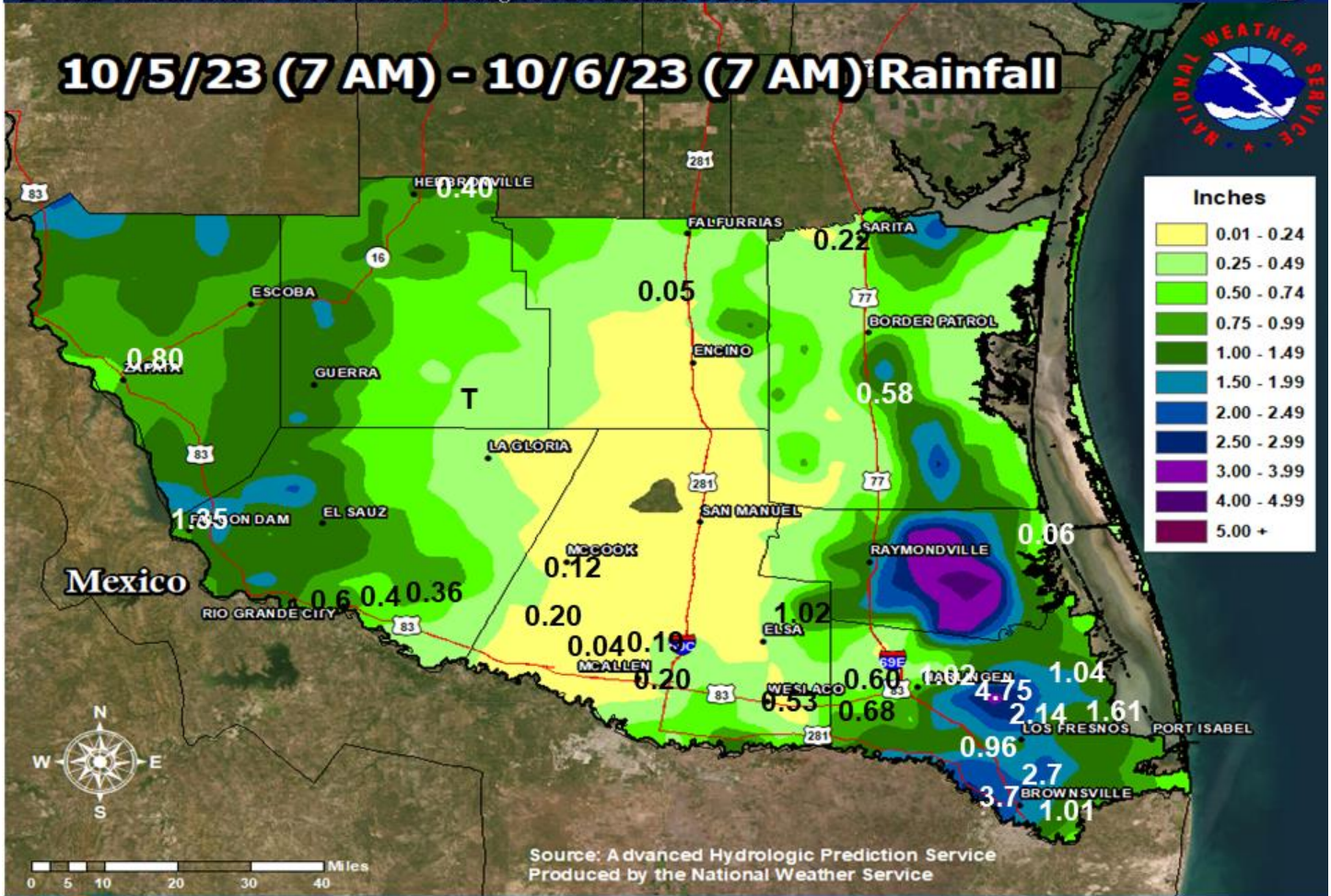


Figure 7. Torrential rains soaked eastern Willacy County, then moved into Cameron – pockets of more than 5 inches likely fell (not sampled by CoCoRaHS or ASOS/AWOS) near Los Fresnos and east of Raymondville/Lyford. Brownsville’s 3 to estimated 4 inches fell in a little more than an hour, with notable flooding in poor drainage locations on the west side of downtown.



Above: A known poor drainage location on Mexico Blvd. near the B&M International Bridge just west of downtown had an estimated 3+ feet of water depth, which partially submerged a few vehicles trapped in the high water. A CoCoRaHS observer reported 3.7” nearby, likely in just over an hour based on radar estimates. Photo credit: Cameron County Emergency Management.

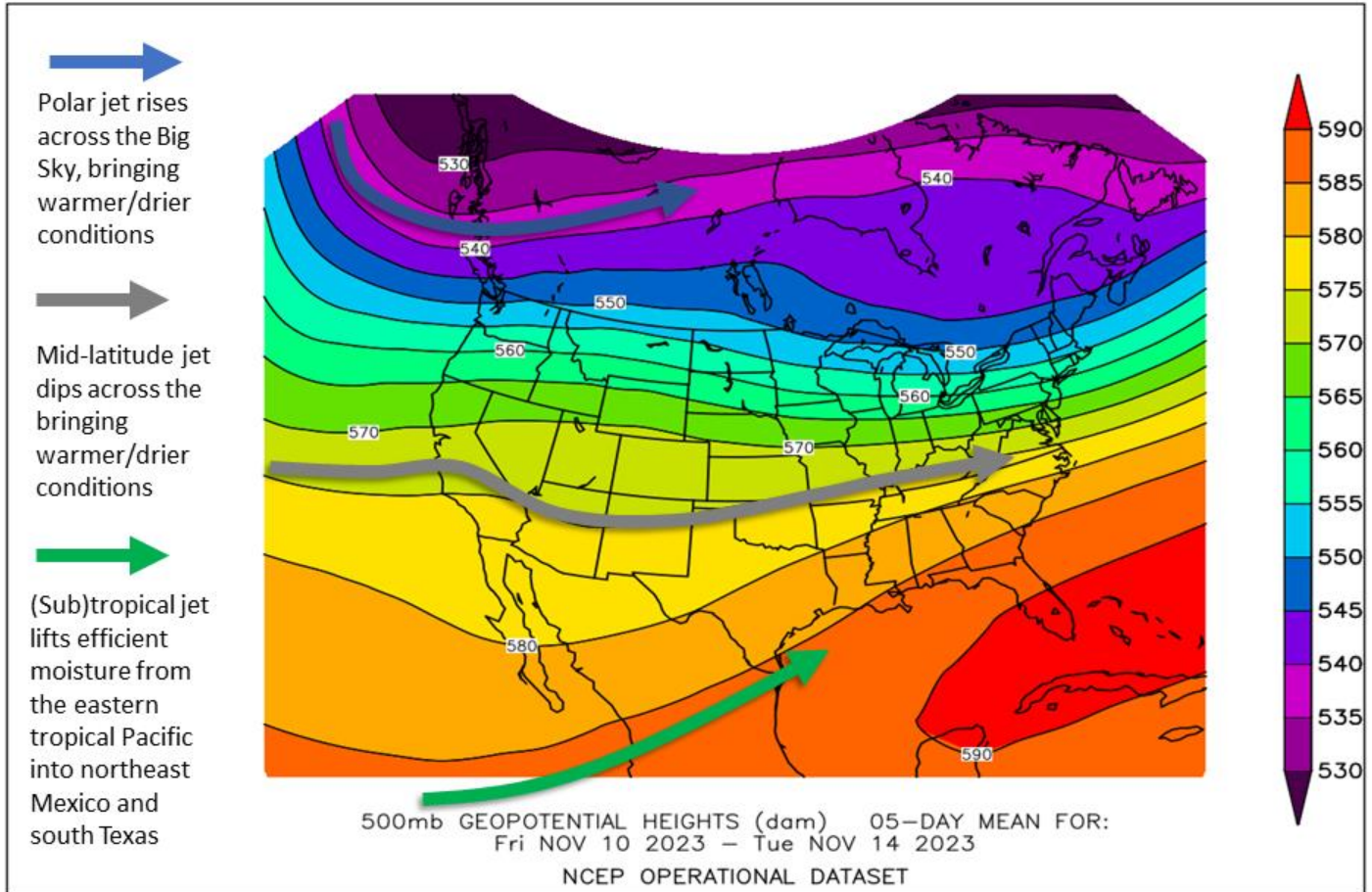
November temperatures initially recovered following the Halloween cold snap, with seasonably warm readings and no rainfall. A flat upper-level high pressure ridge than was overtaken by a mid-latitude energy impulse which had a “tap” into the eastern tropical Pacific – the “classic” El Niño pattern (Figure 8). At the surface, a cold front passed through and the aforementioned disturbances set up a coastal low – a “Texas Nor’easter” – which set up three days of beneficial stratiform rainfall that eventually totaled 3 to more than 6 inches across the entire region (Figure 9), and ultimately cleared out the last of the drought conditions that remained from late October. The steady nature of the rain allowed water to be thoroughly soaked into thirsty soil, with urban ponding – not flooding – the primary impact in populated areas.

A period of seasonably warm weather arrived by mid-month, followed by a pre-Thanksgiving front that returned below average temperatures to the region, along with a period of modest rainfall during the overnight of Thanksgiving Eve into the early morning of Thanksgiving Day. A reinforcing front arrived at the end of Thanksgiving Weekend, which was followed by a relatively vigorous embedded upper level disturbance that dropped more than an inch during the late evening and pre-dawn hours of the 29th and 30th , primarily in Cameron County.

"Classic" El Niño Pattern Gives Us Rain

500 mb Steering Flow, November 10-14, 2023

Weather Forecast Office
Brownsville/Rio Grande Valley, TX



[f](#) [t](#) [v](#) @NWSBrownsville

weather.gov/rgv

Figure 8. An early season example of the classic El Niño pattern arrived on Veterans Day Weekend 2023, combining with a developing coastal low to create the ideal conditions for prolonged, steady rainfall that accumulated to values between two and four times the monthly average across the Rio Grande Valley and Deep South Texas ranchlands.

Veterans Day Weekend Brings Beneficial Rainfall

Weather Forecast Office
Brownsville/Rio Grande Valley, TX



Only Minor Street Flooding in Starr County

11/9/23 (7 AM) - 11/14/23 (7 AM) Rainfall



Figure 9: Measured and estimated rainfall from early November 9th through early November 14th, 2023. Values across SR 281 between Sarita/Riviera and Falfurrias recorded more than four times the monthly rainfall for November; elsewhere, many areas received two to three times the monthly rainfall average – mostly between November 10 and 12.

Autumn Overall saw the transition from late summer searing heat – sometimes a feature of a moderate to strong El Niño – to the more traditional El Niño pattern through much of November that turned heat and drought into green (for most) and temperatures ranging from cool to mild, rather than hot and oppressive. Unfortunately, rain that fell across the rich agricultural region of the Rio Grande Valley was only sufficient to be completely absorbed and not “stored” on top of the soil – hence, abnormal dryness remained at the start of December despite November ranking among the top ten wettest on record at most sites.

While the rainfall was beneficial to the Valley, filling up detention ponds and reducing the need for yard watering and additional early-planting season irrigation, none of it fell into the headwaters of the middle Rio Grande basin that feeds Amistad International Reservoir, and amounts that fed into Falcon International Reservoir were only sufficient to bring levels back to the 30-year low point. Stage 2 water restrictions – often issued when the U.S. share of water conservation between Amistad and Falcon is below 25 percent – remained in place to begin winter 2023/2024. At the start of December, Amistad’s total water conservation share was just 27.3 percent, a continued new record low for this time of year. Falcon’s level had risen from a low of 13.2 percent in early October to 17.3 percent at the start of December – still far below comfortable values for residents and agricultural land/livestock managers alike.

While there remained hope for additional rain, under more clouds than sunshine, through winter – that rain was no guarantee for the Rio Grande Valley, and more likely than not to miss the watershed. This would prolong the concerns of municipalities and growers/livestock managers alike, and require continued vigilance through water conservation headed toward spring.

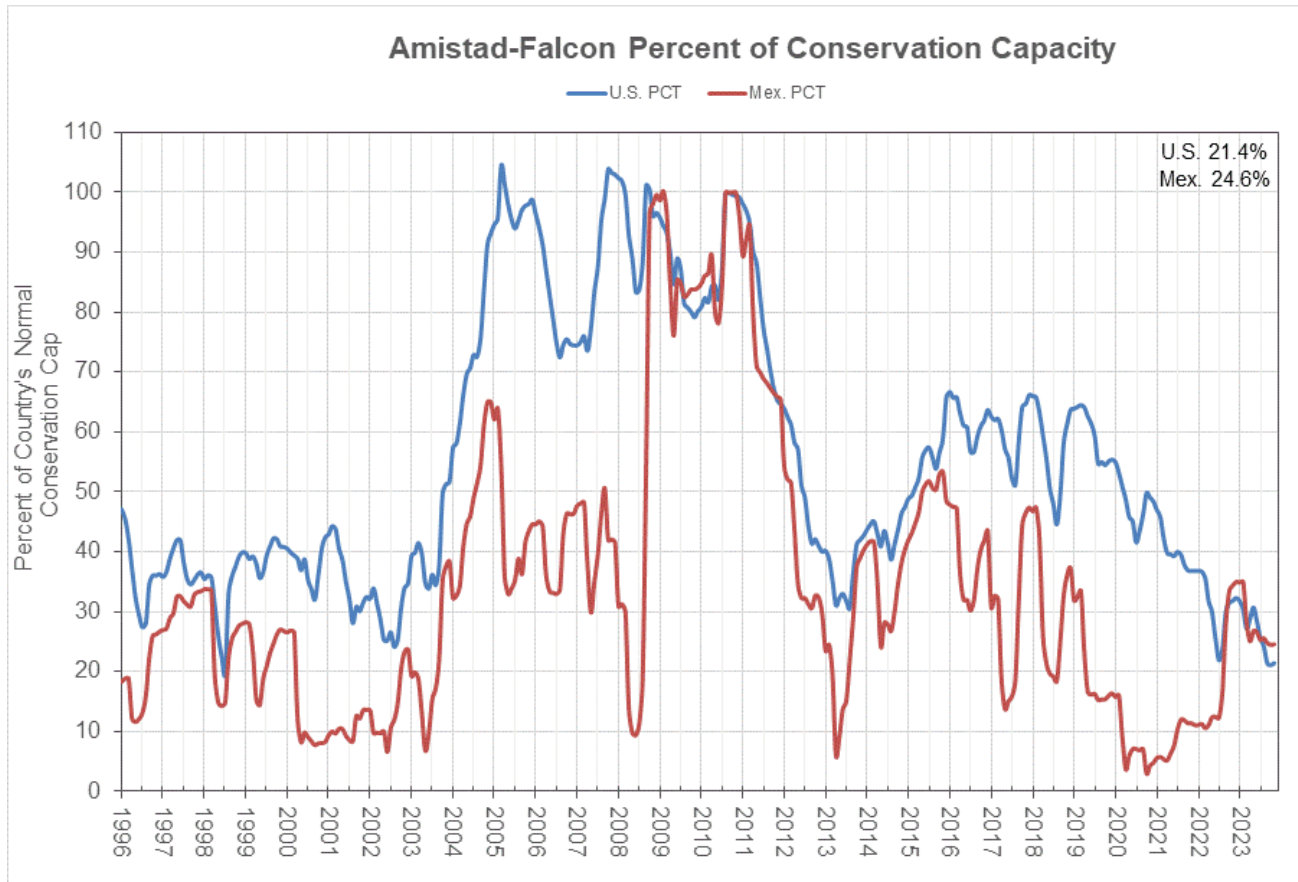


Figure 10 Percent of Conservation (ownership) Capacity for the US and Mexico, Amistad minus Falcon International Reservoirs. Since mid-summer, the US percentage remained below 25 percent, maintaining Stage 2 water conservation rules in more than a half-dozen Valley communities. The value of 21.4 percent was only slightly higher than the minimum of 20.9 percent in early October, and remained among the lowest values in the past 25 years. Data courtesy of the International Boundary and Water Commission.



Above: Green-up in north Brownsville on November 13th, following the steady, beneficial rains through the Veterans Day 2023 weekend.