

Rio Grande Valley 2023 Review

From Drought to Wetness, Stormy to Searing: 2023 Had Plenty of Contrasts and A Lot to Discuss

Year Sets New Heat Records in a Decade-Plus Full of Them

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

The Year 2023 across the Rio Grande Valley will be memorable for many reasons. **“First”** and foremost was its record warmth in the modern era (Figure 1). A warm late winter and early spring was just a prelude to the searing-hot record astronomical (June 21 to September 22) summer – which virtually locked up the new benchmark, as autumn and early winter (December) had no major cold spells to potentially knock the year off its perch. The Valley’s record heat mirrored that of the planet, which also [set a new heat record in 2023](#).

Second was the drought relief provided by a near-record amount of rainfall during astronomical spring (March 20 through June 21), primarily when the spigot was turned on between March 28 and June 8. Unfortunately, the much-needed rainfall for thirsty crops, gardens, and cattle came at a price: Repeated severe weather events in late April through mid-May that added up to more than \$100 million in estimated property damage, much during a “midnight madness” squall line on April 29th that raked the McAllen/metro region with up to 90 mph wind gusts. Hailstorms started the onslaught on April 21st, and ended it on June 4th and 5th. In addition to the destructive windstorms on April 29th, near 90-mph gusts struck again on May 9th on South Padre Island in the wee hours, and an EF1-scale tornado (86 to 105 mph wind) wrecked Laguna Heights at a similar time (just after 4 AM) just four days later. Unfortunately, very poorly-constructed residences were flattened – leaving one man dead and eleven other persons with injuries. The fatality was the first known non-beach-hazard (i.e. rip/longshore current) death in the Valley since the 2010 flood along the Lower Rio Grande “floodway”.

Finally, despite a few periods of welcome rainfall across the Lower Rio Grande, the already low/very low water storage levels at Amistad International and Falcon International Reservoirs – each which provide critical downstream water supplies – saw scant relief in 2023. In fact, the lack of any deep tropical moisture, tropical waves, or tropical cyclones from the Atlantic or Pacific – combined with the searing hot summer that lasted into early October – had Amistad losing water storage from June through the end of the year. Falcon did likewise through September, with only minor relief in October/November. Record-breaking low values for Amistad – and the Rio Grande Basin overall (based on the Texas share of water availability) were seen from September through the start of 2024.

How will 2024 fare? The first half of January started on warm and dry footing, but a cool/cold period was expected to reverse the trend to close the month. Rainfall may join the party, too...but for how long? With El Niño expected to fade away by late spring – and perhaps “flip” to La Niña in summer and autumn – much is

unknown – except that warmer than average temperatures should once again dominate the calendar. Stay tuned.

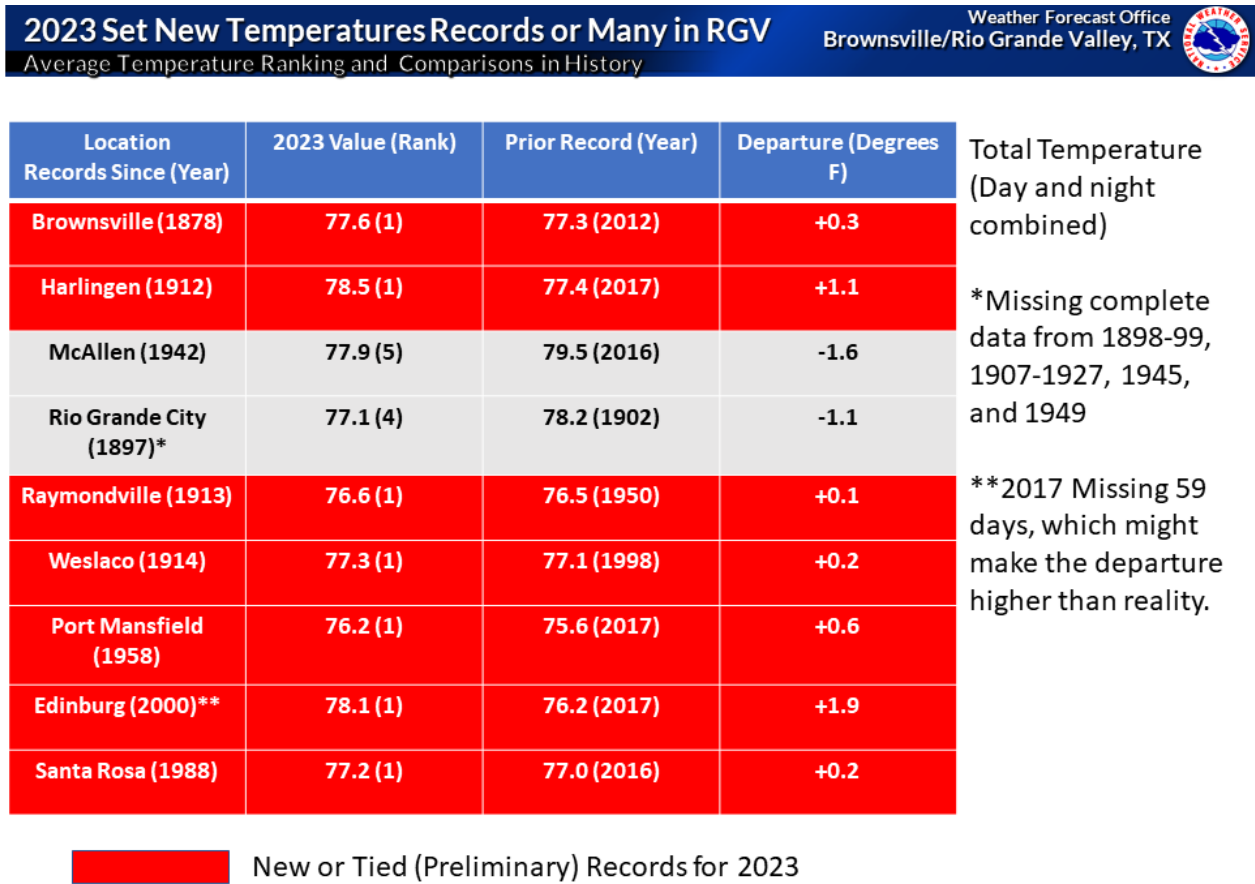


Figure 1. Average temperature (day/night combined) records for long-term climate record stations across the Rio Grande Valley. All but McAllen and Rio Grande City finished top-ranked.

2023 Temperature Records, in Comparison

Top Ten Temperatures Across Selected RGV Locations



Maximum 1-Year Mean Avg Temperature for Brownsville Area, TX (ThreadEx)

Click column heading to sort ascending, click again to sort descending.

Rank	Value	Ending Date	Missing Days
1	77.6	2023-12-31	0
2	77.3	2012-12-31	0
3	77.2	2020-12-31	0
4	77.2	2017-12-31	0
5	76.6	2019-12-31	0
6	76.4	2021-12-31	0
7	76.4	2016-12-31	0
8	76.4	2018-12-31	0
9	76.1	2011-12-31	0
10	76.0	2006-12-31	0

Period of record: 1878-01-01 to 2024-01-03

Maximum 1-Year Mean Avg Temperature for McAllen Area, TX (ThreadEx)

Click column heading to sort ascending, click again to sort descending.

Rank	Value	Ending Date	Missing Days
1	79.5	2016-12-31	0
2	79.5	2017-12-31	0
3	78.3	2012-12-31	0
4	78.2	2009-12-31	0
5	77.9	2023-12-31	4
6	77.8	2020-12-31	1
7	77.7	2018-12-31	3
8	77.7	2011-12-31	2
9	77.6	2019-12-31	1
10	77.1	1999-12-31	0

Period of record: 1941-06-01 to 2024-01-03

Maximum 1-Year Mean Avg Temperature for HARLINGEN, TX

Click column heading to sort ascending, click again to sort descending.

Rank	Value	Ending Date	Missing Days
1	78.5	2023-12-31	24
2	77.4	2017-12-31	36
3	77.0	2016-12-31	17
4	76.8	2020-12-31	24
5	76.6	1945-12-31	18
6	76.4	1946-12-31	26
7	76.4	2012-12-31	14
8	76.3	1957-12-31	10
9	76.3	2019-12-31	47
10	76.3	1950-12-31	1

Period of record: 1912-02-07 to 2024-01-04

Maximum 1-Year Mean Avg Temperature for RIO GRANDE CITY, TX

Click column heading to sort ascending, click again to sort descending.

Rank	Value	Ending Date	Missing Days
1	78.2	1902-12-31	4
2	77.7	1946-12-31	45
3	77.7	1901-12-31	16
4	77.1	2023-12-31	9
5	76.9	1999-12-31	50
6	76.8	2000-12-31	22
7	76.8	2017-12-31	40
8	76.5	1933-12-31	5
9	76.4	2016-12-31	24
10	75.9	1996-12-31	21

Period of record: 1897-01-01 to 2024-01-04

Maximum 1-Year Mean Avg Temperature for RAYMONDVILLE, TX

Click column heading to sort ascending, click again to sort descending.

Rank	Value	Ending Date	Missing Days
1	76.6	2023-12-31	62
2	76.5	1950-12-31	36
3	76.3	1953-12-31	7
4	76.1	2020-12-31	45
5	75.9	1946-12-31	18
6	75.9	1945-12-31	16
7	75.7	1927-12-31	12
8	75.5	2012-12-31	13
9	75.5	2005-12-31	5
10	77.1	2021-12-31	52

Period of record: 1913-01-01 to 2024-01-03

Maximum 1-Year Mean Avg Temperature for WESLACO, TX

Click column heading to sort ascending, click again to sort descending.

Rank	Value	Ending Date	Missing Days
1	77.3	2023-12-31	31
2	77.1	1998-12-31	16
3	76.8	1950-12-31	4
4	76.3	1949-12-31	34
5	76.2	1946-12-31	21
6	76.1	1999-12-31	13
7	76.0	1953-12-31	8
8	75.9	2000-12-31	15
9	75.9	1994-12-31	60
10	75.8	1940-12-31	51

Period of record: 1914-02-18 to 2024-01-04

Maximum 1-Year Mean Avg Temperature for PORT MANSFIELD, TX

Click column heading to sort ascending, click again to sort descending.

Rank	Value	Ending Date	Missing Days
1	76.2	2023-12-31	41
2	75.6	2017-12-31	25
3	75.2	2016-12-31	18
4	75.2	2012-12-31	15
5	74.6	2006-12-31	28
6	74.5	2000-12-31	48
7	74.4	2021-12-31	51
8	74.3	2005-12-31	30
9	74.2	1999-12-31	37
10	74.0	2011-12-31	23

Period of record: 1958-02-07 to 2024-01-04

Maximum 1-Year Mean Avg Temperature for EDINBURG, TX

Click column heading to sort ascending, click again to sort descending.

Rank	Value	Ending Date	Missing Days
1	78.1	2023-12-31	22
2	76.2	2017-12-31	59
3	76.2	2006-12-31	2
4	76.1	2009-12-31	13
5	75.7	2021-12-31	9
6	75.6	2001-12-31	8
7	75.6	2011-12-31	13
8	75.6	2000-12-31	20
9	75.1	2002-12-31	19
10	75.0	2007-12-31	7

Period of record: 2000-01-01 to 2024-01-04

Maximum 1-Year Mean Avg Temperature for SANTA ROSA 3 WNW, TX

Click column heading to sort ascending, click again to sort descending.

Rank	Value	Ending Date	Missing Days
1	77.2	2023-12-31	0
2	77.0	2016-12-31	9
3	76.3	2005-12-31	31
4	76.2	2017-12-31	2
5	76.2	1998-12-31	13
6	76.1	2000-12-31	10
7	75.9	2020-12-31	14
8	75.6	2002-12-31	28
9	75.5	2019-12-31	23
10	75.5	1999-12-31	3

Period of record: 1987-03-01 to 2024-01-04

Figure 2. 2023 Comparative temperature rankings (“top ten lists”) for available Rio Grande Valley locations. Raymondville was included, despite having two additional days missing (62) than generally required (60) for a calendar year. For Brownsville, Harlingen, and McAllen, the majority of years in the top ten warmest occurred since 2011.



Texas, Climate Division 10

December 2023 Average Temperature Rankings

Download:

[↓ CSV](#)
[↓ JSON](#)
[↓ XML](#)

View Period (Months): All 1 2 3 4 5 6 7 8 9 10 11 12 18 24 36 48 60

Record Coolest		Bottom 1/10		Bottom 1/3		Normal		Top 1/3		Top 1/10		Record Warmest	
Period	Value	1901-2000 Mean	Anomaly	Rank (1895-2023)	Coolest/Warmest Since	Record							
Jan-Dec 2023 12-Month	76.9°F (24.9°C)	73.6°F (23.1°C)	3.3°F (1.8°C)	128th Coolest	Coolest since: 2022	1976							
				2nd Warmest	Warmest since: 2012	1902							
	Ties: 2012												

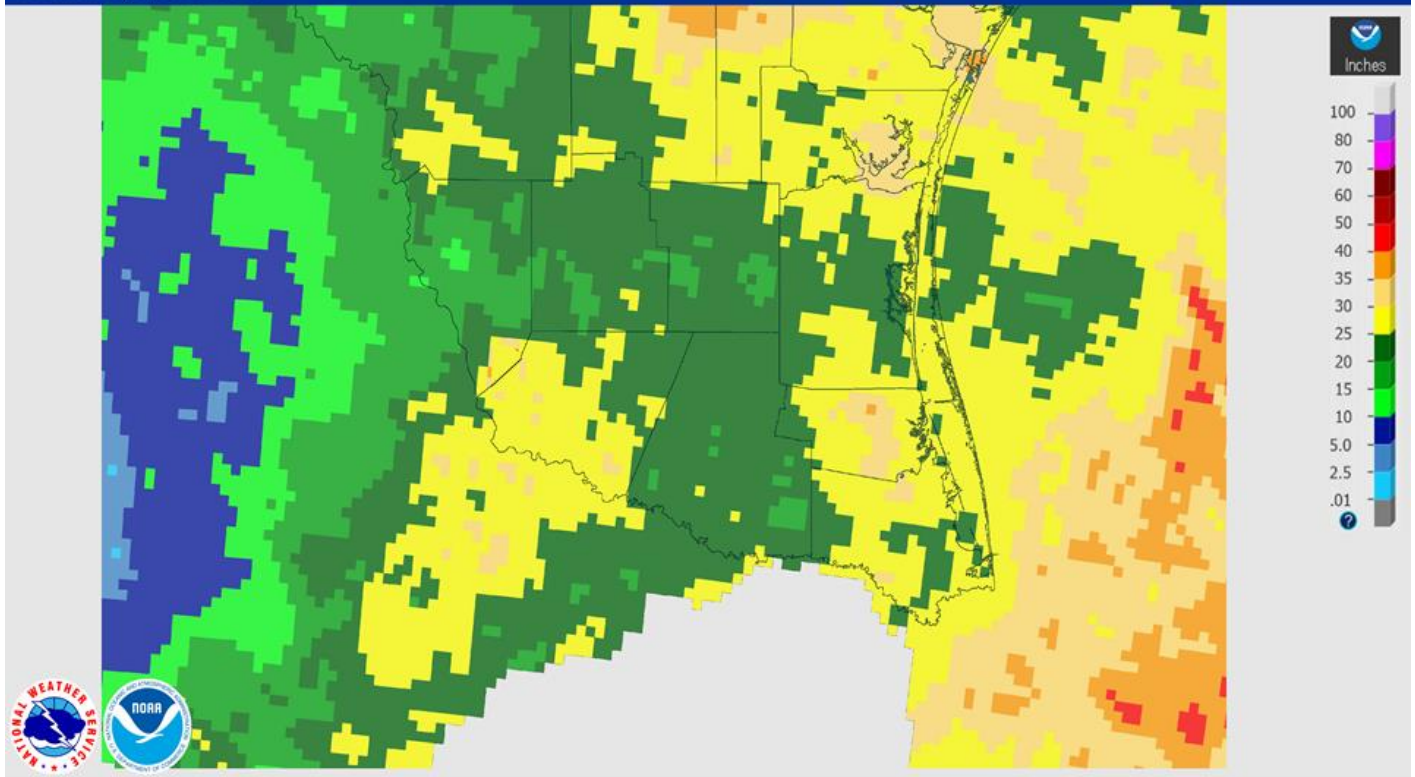
Note: Effectively, 2023 is the **warmest** in the *modern* record. In 1902, there were many fewer observation locations across the lower/mid Valley. Brownsville (since 1878) was the only high-quality site of record then.

Figure 3. Twelve-month temperature rankings for the period-of-record kept by the National Centers for Environmental Information (NCEI).



January 01, 2023 Annual Observed Precipitation

Created on: January 06, 2024 - 20:22 UTC
Valid on: January 01, 2024 12:00 UTC



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Figure 4: Bias-Corrected Rainfall for 2023. Locations with the highest rainfall (25 to 30 inches) included the coastal counties (Cameron through Kenedy) and much of Starr County. Other locations ranged from 15 to 25 inches.

2023 Percentage of Average Rainfall (Bias-Corrected)

Based on the 1991-2020 30-year Average

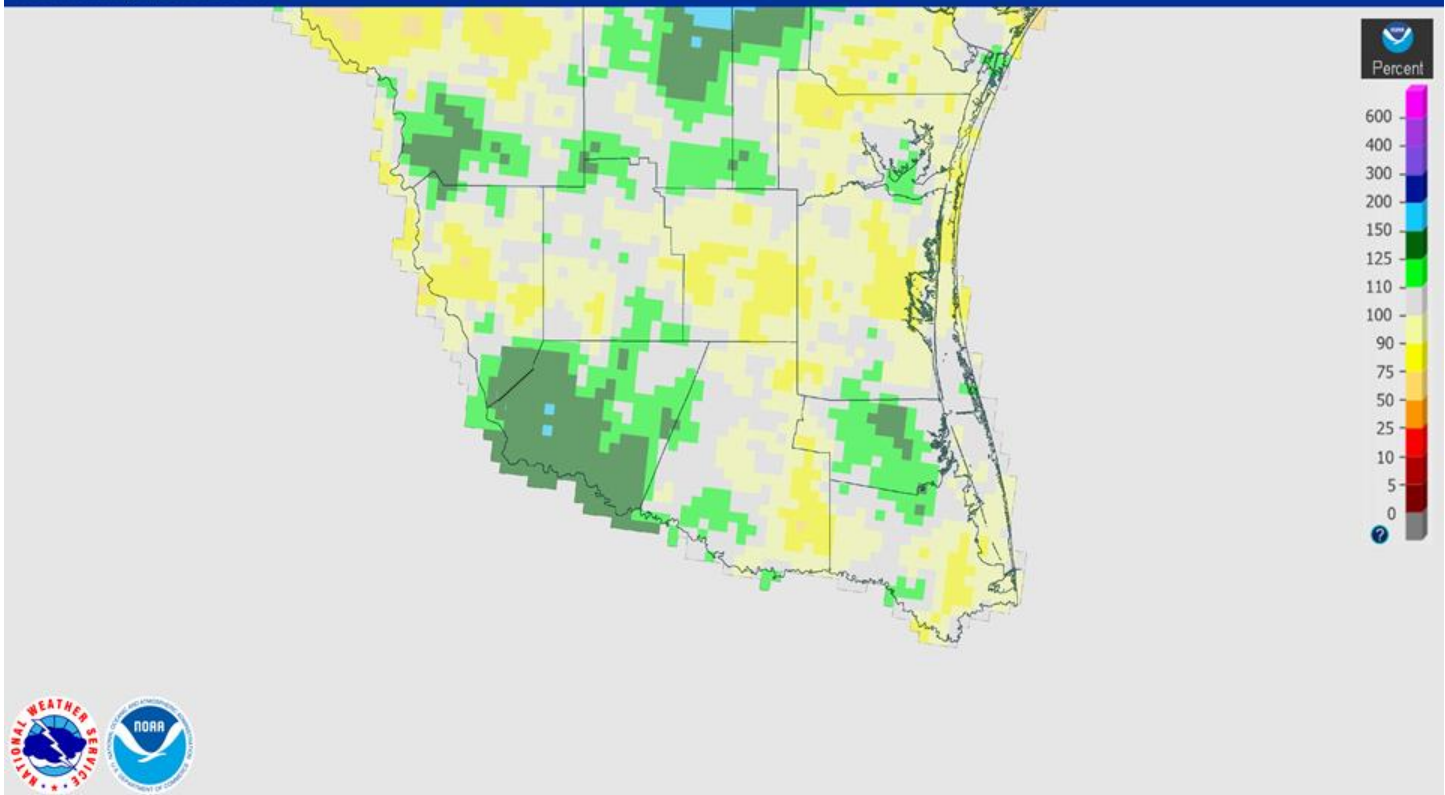
Weather Forecast Office
Brownsville/Rio Grande Valley, TX



January 01, 2023 Annual Percent Precipitation

Created on: January 06, 2024 - 20:25 UTC

Valid on: January 01, 2024 12:00 UTC



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weather.gov/rgv

Figure 5. Bias-Corrected annual percent of average rainfall, 2023. On the whole, the Rio Grande Valley/Deep S. Texas ranch region ended up close to the 30-year (1991-2020) average. Wetter-than-average locations in Starr, northern Jim Hogg, and Willacy County were balanced by slightly drier than average pockets in southeast Cameron, Zapata, and Brooks County.

Month-by-Month Summary

January 2023 was less eventful than December 2022 regarding sharp temperature changes. For Winter Texans visiting from northern climes such as the Dakotas, upper Mississippi Valley, and the Canadian Prairies, January was heavenly. Filled with mainly sunny, mild to warm days, mild to warm evenings, and pleasantly cool mornings, the weather was ideal for outdoor outings which draw so many here each year. A mid-month (January 13th/14th) cold front dropped morning temperatures into the 30s (14th) with another minor front doing the same around the 25th to 27th. The first significant “nasty ‘norther” arrived late on the 30th, with biting chill and drizzle/light rain closing the month. Rainfall was paltry across the region, with the sole exception along the Cameron and Willacy County coast, where an estimated and measured 0.25 to 0.75” fell. Peak rainfall included 0.63” 12.6 miles east of Brownsville, and 0.61” 1.8 miles northwest of Laguna Vista. Percentage of rainfall ranged from 0 to 5 percent across Starr, Jim Hogg, and Zapata, to 5 to 25 percent across most of the populated Lower Rio Grande Valley, with 50 percent in the areas mentioned above.

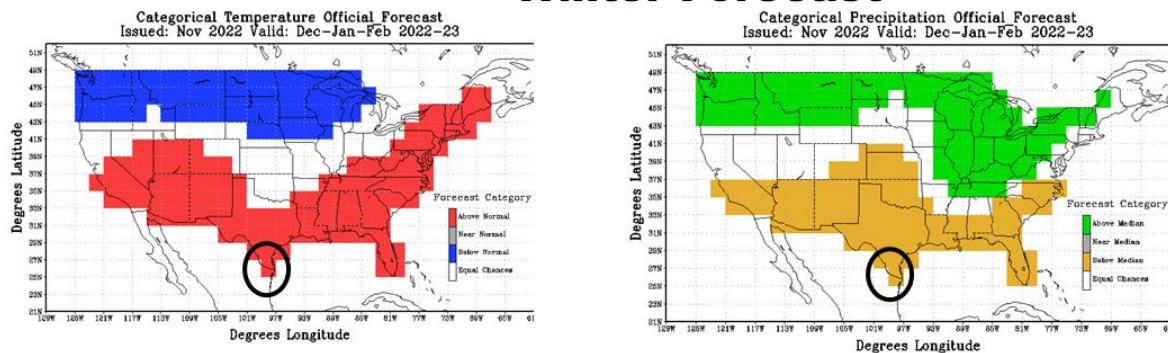
The warm temperatures ranked among the top ten warmest Januaries, including Brownsville (8th warmest), Harlingen (warmest on record), McAllen (5th warmest), and Rio Grande City (7th warmest).

February opened with a three-day continuation of the nasty chill that ended January; on the 1st, temperatures barely budged from 40°F all day and evening; combined with stiff north winds, it felt closer to 30°F during this time especially along and east of U.S.77/IH-69E in Cameron, Willacy, and Kenedy County. Between the 4th and 18th, the weather was a temperature roller-coaster that leaned cool (for the period). Beginning on the 19th, and continuing through month's end, much above average temperatures and humidity dominated the region as a broad subtropical high pressure ridge aloft stretched from the Bahamas to the Lower Texas coast and northeast Mexico. The persistent heat for those final 10 days turned a notably below-average month into an above average month, with temperatures up to 2°F above average for most.

As had been the story for winter, rainfall was few and far between, with very light amounts during the “nasty ‘norther’” on the 1st and 2nd, and a thin stripe of rain from Weslaco through the Willacy/Hidalgo line on the 8th and a small area of rain along the Rio Grande near Brownsville on the 10th. Most areas were virtually rain-free through the month. The warmth and prolonged lack of notable rain continued to worsen drought levels as the sun angle rose and evaporation rates steadily increased. By the start of March, Level 2 to 3 drought dominated the ranchlands, and moderate (Level 1) the remainder of the Lower Valley.

For Winter Overall, the main story was the low rainfall combined with enough warm periods, despite short-lived cold outbreaks, to verify the season's forecast as “warm and dry” for the Lower Rio Grande Valley/Deep South Texas Brush Country and Coastal Plains with precision.

Winter Forecast



Winter Observed

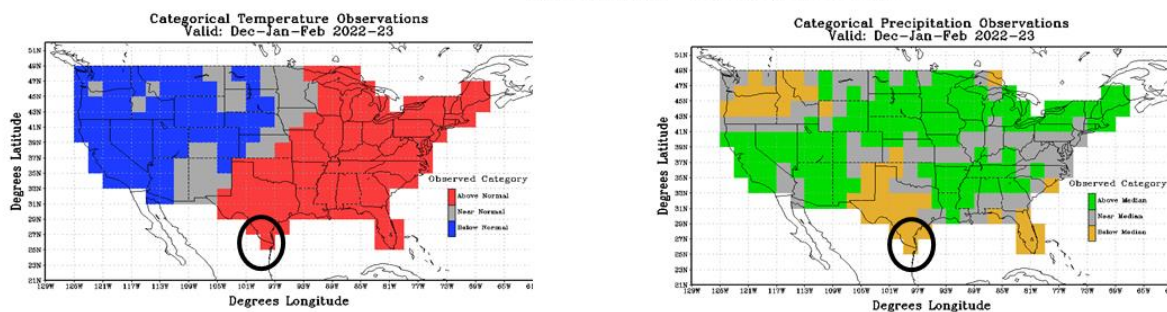
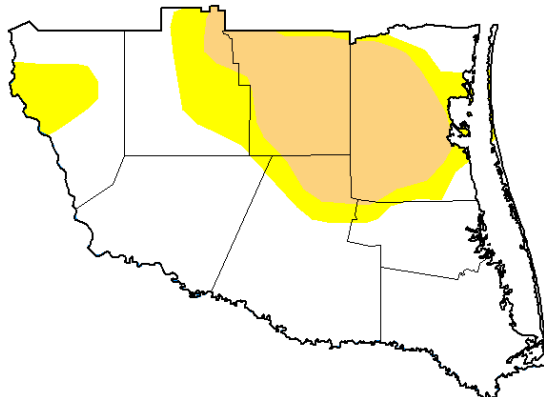


Figure 6. NOAA Climate Prediction Center Winter (December 2022-February 2023) forecast (top) vs. observed (bottom) temperature and precipitation. Black circle represents the south Texas/Lower Rio Grande Valley region.

Drought gradually, then more rapidly, worsened across the region; even the Lower Valley, which had been receiving “just in time” rainfall, failed to receive necessary rains as February closed. Though February saw full green-up of trees and florals, the rangeland/unirrigated grass and brush continued to turn yellow and brown – albeit much slower than across the ranchlands from Zapata through Kenedy County (Figures 7 and 8, below).

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

December 6, 2022
(Released Thursday, Dec. 8, 2022)
Valid 7 a.m. EST



Drought Conditions (Percent Area)

	None	D0-D4	D1-D4	D2-D4	D3-D4	D4
Current	62.27	37.73	22.64	0.00	0.00	0.00
Last Week 11-29-2022	62.27	37.73	8.67	0.00	0.00	0.00
3 Months Ago 09-06-2022	88.77	11.23	4.71	0.00	0.00	0.00
Start of Calendar Year 01-04-2022	72.63	27.37	4.09	0.00	0.00	0.00
Start of Water Year 09-27-2022	100.00	0.00	0.00	0.00	0.00	0.00
One Year Ago 12-07-2021	81.77	18.23	0.00	0.00	0.00	0.00

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

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:
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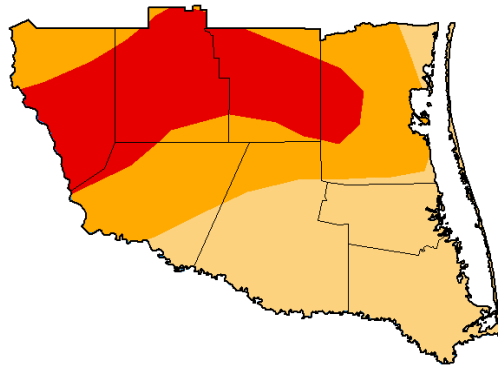
droughtmonitor.unl.edu

Figure 7. US Drought Monitor, Brownsville/Rio Grande Valley NWS service area, on December 6, 2022. At this point, the Brooks/Kenedy County ranchlands were a rainfall "hole" and had reached moderate (D1) drought status.

For the season, rainfall totals ranked among the top ten percent driest. Brownsville (2nd driest, at 0.80”), Harlingen (2nd driest, at 0.63”), McAllen (8th driest at 0.95”), and Rio Grande City (12th driest at 0.78”) and, combined with the overall warmth, were the catalysts for the worsening drought. Temperature ranks were similar, with Brownsville at 7th warmest winter (65.8°F), Harlingen* at 4th warmest (66.9°F), McAllen at 3rd warmest (66.6°F), and Rio Grande City* at 4th warmest (64.1°F).

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

February 28, 2023
(Released Thursday, Mar. 2, 2023)
Valid 7 a.m. EST



Drought Conditions (Percent Area)

	None	D0-D4	D1-D4	D2-D4	D3-D4	D4
Current	0.00	100.00	100.00	64.03	30.51	0.00
Last Week 02-21-2023	0.00	100.00	100.00	50.51	0.00	0.00
3 Months Ago 11-29-2022	62.27	37.73	8.67	0.00	0.00	0.00
Start of Calendar Year 01-03-2023	42.76	57.24	42.53	0.00	0.00	0.00
Start of Water Year 09-27-2022	100.00	0.00	0.00	0.00	0.00	0.00
One Year Ago 03-01-2022	52.18	47.82	33.03	6.73	0.44	0.00

Intensity:
 None D2 Severe Drought
 D0 Abnormally Dry D3 Extreme Drought
 D1 Moderate Drought D4 Exceptional Drought

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>

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droughtmonitor.unl.edu

Figure 8. U.S. Drought Monitor, NWS Brownsville/Rio Grande Valley service area, February 28, 2023. Severe (D2) to Extreme (D3) Drought covered the ranchlands, with Moderate (D1) drought having reached the populated Rio Grande Valley.

March 12, 2023 90-Day Percent Precipitation

Created on: March 12, 2023 - 21:42 UTC
Valid on: March 12, 2023 12:00 UTC

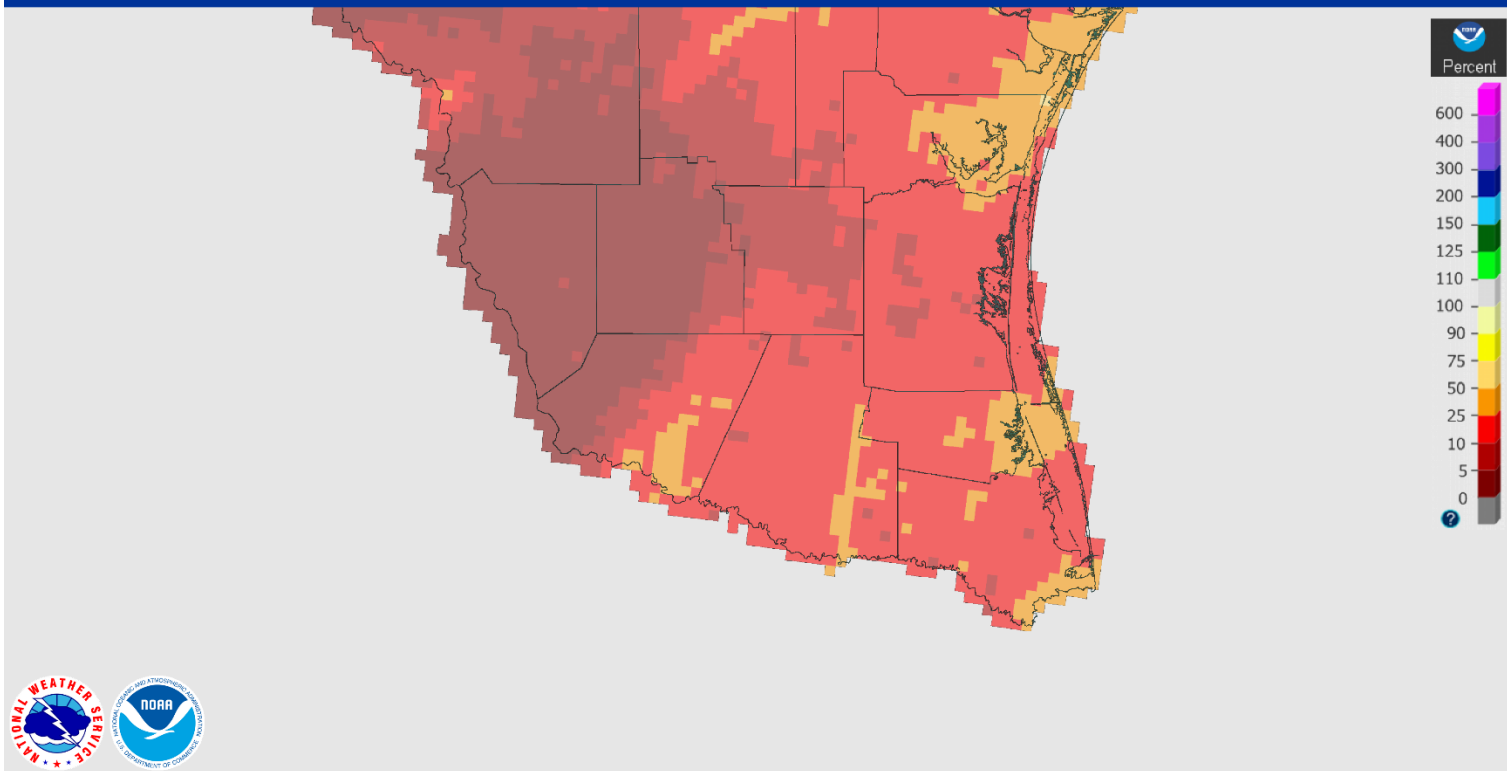


Figure 9. Percentage of average rainfall for mid December 2022 through mid March 2023. Note the near-zero amounts across the western third of the region (Starr, Jim Hogg, Zapata), with 10 to 25 percent in most other locations.

For Falcon International Reservoir, the benefits of heavy rainfall in mid to late August was all dried up by the end of February, with the only hope potentially to come from a significant release of water from still nearly-full reservoirs along the Rio Grande, Rio Conchos, and Rio San Juan watersheds in Mexico. The Texas share of water in Falcon International Reservoir remained below 30 year low benchmarks to begin the year; the total share had dropped from 18.4 percent in January to 16.4 in mid March – a result of accelerating evaporation rates due to record heat from February 20th through March 12th.

The combination of worsening drought, record/near record low water levels in Falcon International Reservoir, and top ten warmth implies urgency for wildfire prevention activities and water conservation across the Lower Rio Grande Valley and the ranch country to the north, as spring moves forward. Perhaps there will be some notable rain relief at some point after mid April and especially May, but uncertainty remains very high.

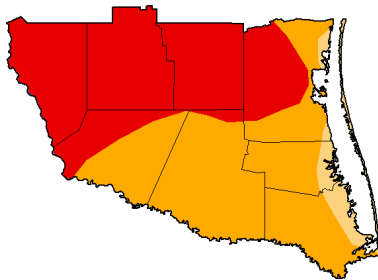
Rio Grande Valley Spring 2023 Review

**Spring 2023 Weather Story for the Rio Grande Valley:
Drought...Out! Early March Dryness Erased by Spring Rains
Severe Thunderstorms Cause Repeat Damage in April and May**

By Barry Goldsmith

Warning Coordination Meteorologist
NWS Brownsville/Rio Grande Valley

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



March 7, 2023
(Released Thursday, Mar. 9, 2023)
Valid 7 a.m. EST

	Drought Conditions (Percent Area)					
	None	D0-D4	D1-D4	D2-D4	D3-D4	D4
Current	0.00	100.00	100.00	95.51	49.64	0.00
Last Week 02-28-2023	0.00	100.00	100.00	64.03	30.51	0.00
3 Months Ago 12-06-2022	62.27	37.73	22.84	0.00	0.00	0.00
Start of Calendar Year 01-03-2023	42.76	57.24	42.53	0.00	0.00	0.00
Start of Water Year 09-27-2022	100.00	0.00	0.00	0.00	0.00	0.00
One Year Ago 03-08-2022	39.10	60.90	33.03	18.11	2.77	0.00

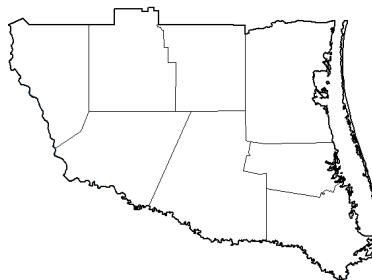
Intensity
 None (white) D0 Abnormally Dry (yellow) D1 Moderate Drought (orange) D2 Severe Drought (red) D3 Extreme Drought (dark red) D4 Exceptional Drought (black)

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>

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



June 6, 2023
(Released Thursday, Jun. 8, 2023)
Valid 8 a.m. EDT

	Drought Conditions (Percent Area)					
	None	D0-D4	D1-D4	D2-D4	D3-D4	D4
Current	100.00	0.00	0.00	0.00	0.00	0.00
Last Week 05-30-2023	98.49	1.51	0.00	0.00	0.00	0.00
3 Months Ago 03-07-2023	0.00	100.00	100.00	95.51	49.64	0.00
Start of Calendar Year 01-03-2023	42.76	57.24	42.53	0.00	0.00	0.00
Start of Water Year 09-27-2022	100.00	0.00	0.00	0.00	0.00	0.00
One Year Ago 06-07-2022	88.44	11.56	2.65	0.05	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)

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Author:
Lindsay Johnson
National Drought Mitigation Center



Figure 10: Severe (D2) Drought covered the Lower Rio Grande Valley, with Extreme (D3) Drought covering the South Texas Brush Country/Rio Grande Plains from Zapata through Kenedy County to begin spring 2023. Frequent and locally heavy rains that began March 28th in the Lower Valley and eventually covered all of Deep South Texas through spring erased the drought and dryness by the start of June 2023.

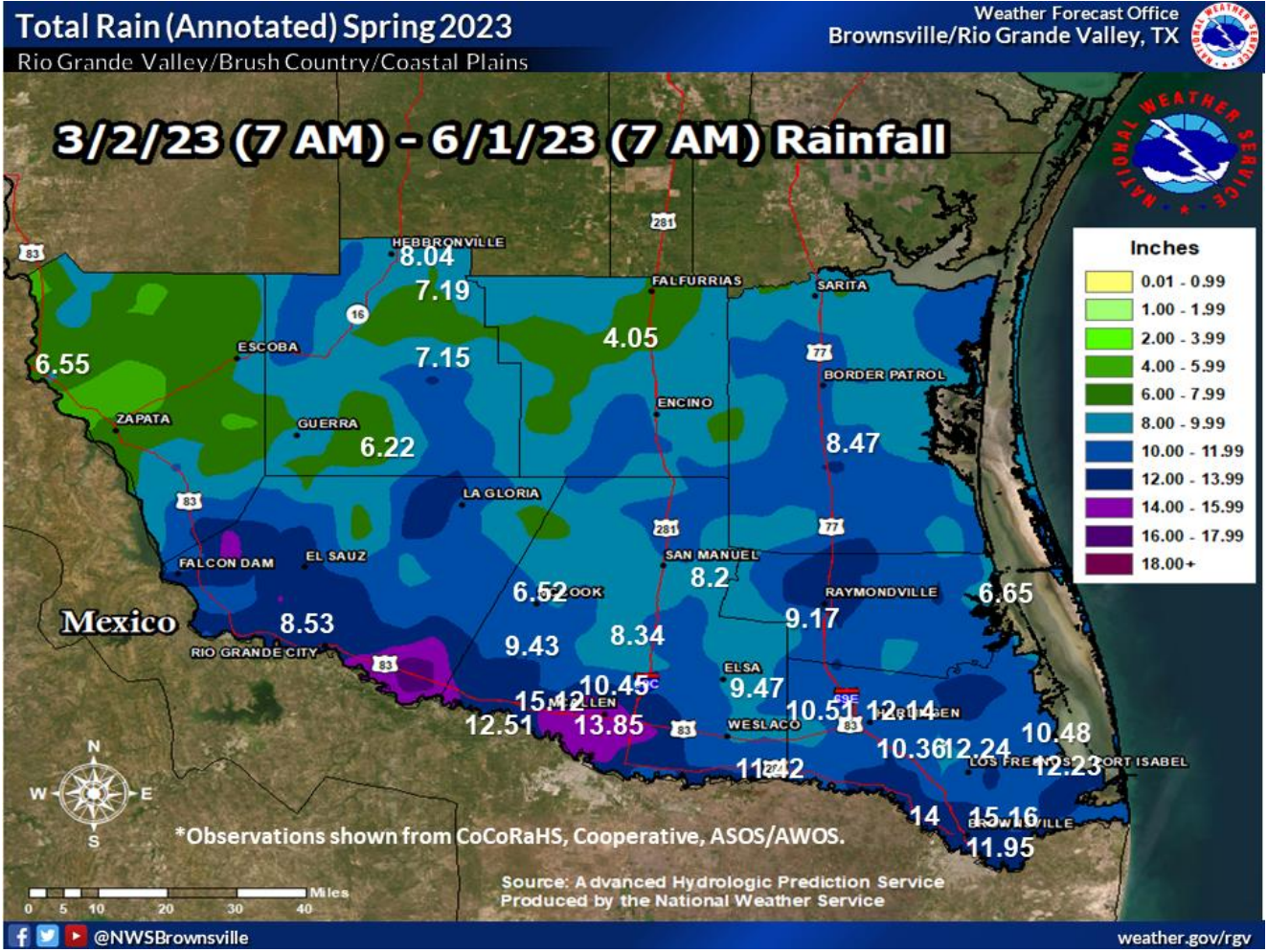


Figure 11. Annotated rainfall map for spring 2023 across the Lower Rio Grande Valley/Deep South Texas region.

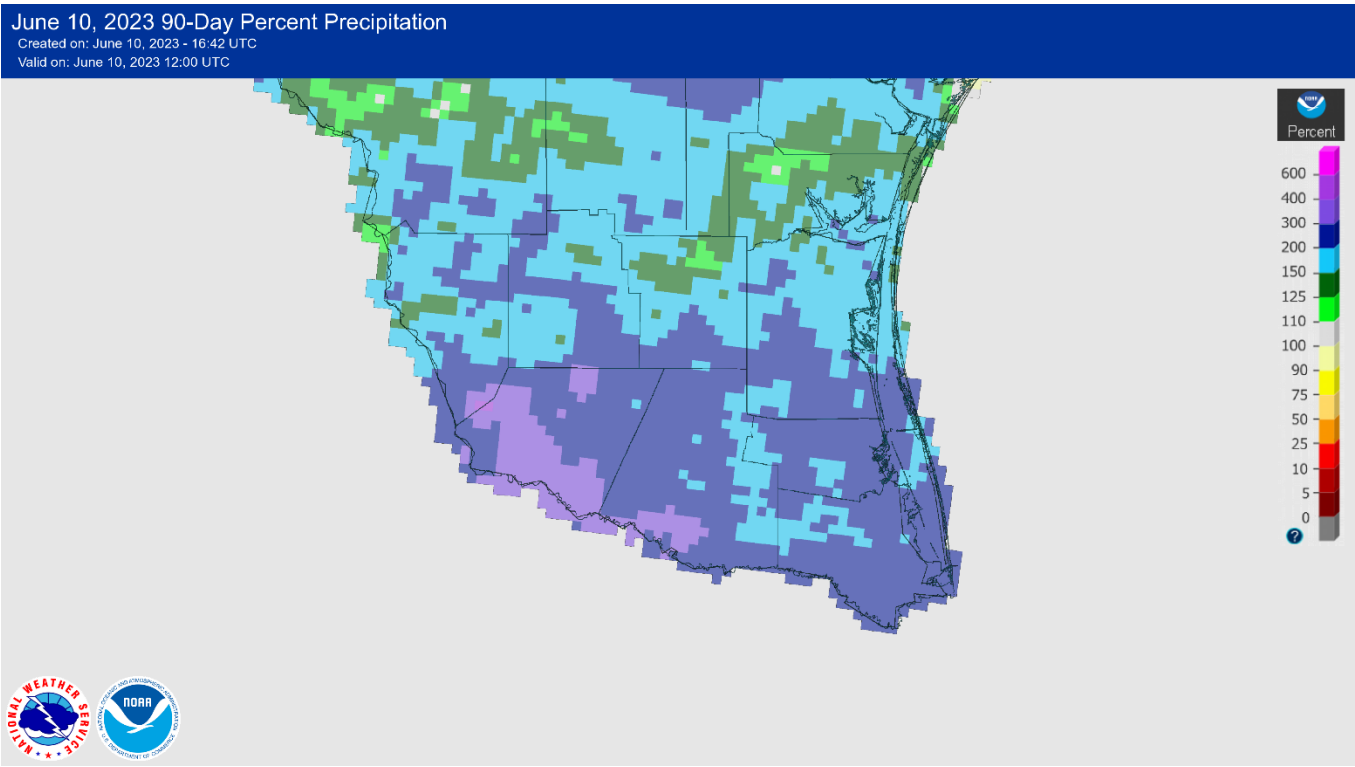


Figure 12. Rainfall departure from average, March 13 through June 10, 2023. This includes the balance of spring rainfall, along with additional localized rains across the region from June 3 through 8, 2023.

Month-by-Month Summary

March picked up where February left off: Warm, breezy to windy, with no rainfall of note. The spring drought peaked in March, with difficulties noted by farmers and ranchers providing water to thirsty crops and livestock as the month wore on. On March 4th, a day with low humidity and a modest afternoon sea breeze, two large wildfires were noted: one in southwest Brooks County that burned more than 900 acres, and a second of unknown size but visually reported just west of the Border Patrol Checkpoint along U.S. 77 just north of Armstrong (Kenedy County). Though largely rain-free weather persisted across the Brush Country/Kenedy Brooks County ranches for most of the month, these were the only known large wildfires – a sharp decline in acreage burned between February and April 2022, when more than 30 thousand acres burned mostly across farm/ranch country north of the populated Lower Rio Grande Valley. A strong emphasis on wildfire prevention from NWS and core partners may have been a difference maker – before the onset of late March and especially April rains put an end to the wildfire season later in April, when green-up began in earnest.

A band of torrential-rain producing thunderstorms during the afternoon of March 28th developed and moved from southeast Starr County along the IH-2 corridor and along the Rio Grande before winding down in Cameron County. Between 3 and nearly 5” fell across the McAllen metropolitan area, in some cases double the monthly average in just one day. The rain was a harbinger of weather to come during April and May, which would become the most active severe weather season in the Valley since 2012.

The warm to hot and dry first half of March, which culminated in triple-digit heat on the 12th away from the coast set the temperature tone for the month. A St. Patrick’s Day Weekend cold snap briefly dented the warmth, as another triple-digit day arrived on the 24th. Overall, temperatures ranged from 2 to 4 degrees above the 1991-2020 averages, and ranked around the top ten warmest on record.

The combination of continued warm to hot, dry, and occasionally breezy conditions with increased releases from Falcon International Reservoir to aid agricultural needs in northeast Mexico as well as the Lower Valley resulted in a 20-year low of the total water storage levels at month’s end. The rains which soaked the IH-2 corridor on March 28 missed the Lower Rio Grande basin’s headwaters, and values plunged to as low as 11.4% of total capacity. Increased releases would soon follow from Amistad International Reservoir to help backfill some of the lost water into Falcon, but values on rose to 17% of capacity by mid-April – still very low for future water supply needs.

April opened dry and warm, before the season’s final notable cool front arrived on the 6th, and was followed by deep southwesterly flow aloft which ultimately produced a widespread and drought-quenching rain event on the 6th through the 8th. Rainfall across all of the eastern half of Texas was “manna”, with peak rainfall of 5 to 8 inches between Houston and Austin/San Antonio. For the southern tip of Texas, 1 to 3” of ‘cool’ rain was quite helpful, with Severe (D2) to Extreme (D3) Drought reduced to mostly Abnormal Dryness (D0) for the populated Lower Valley and D1 (Moderate) for most other areas by April 11.

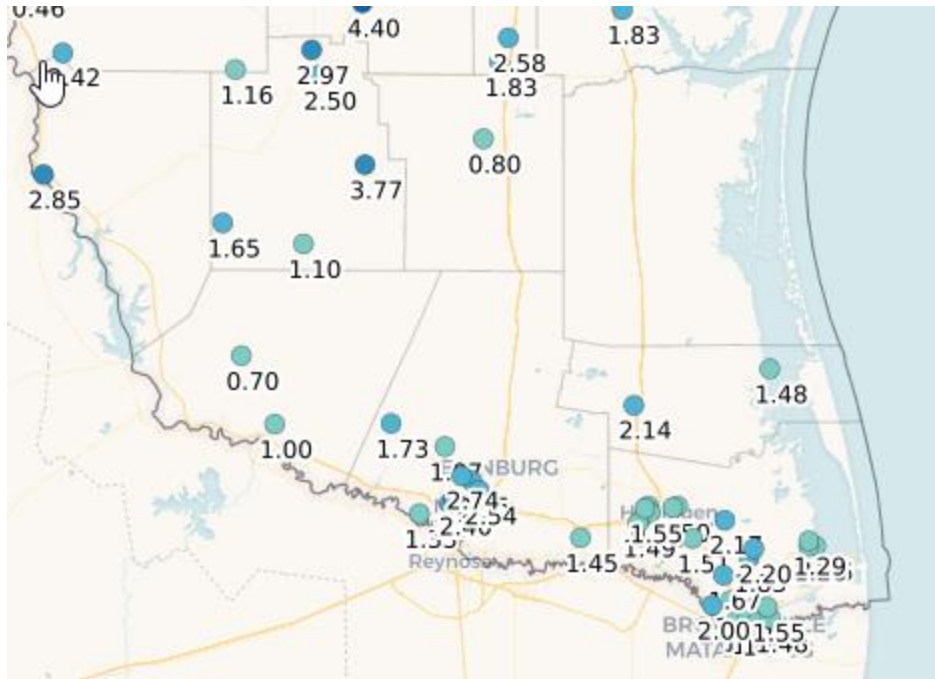


Figure 13. CoCoRaHS rainfall (50 percent completeness or greater) for the Lower Rio Grande Valley/Deep S. Texas region, April 5 to 8, 2023.

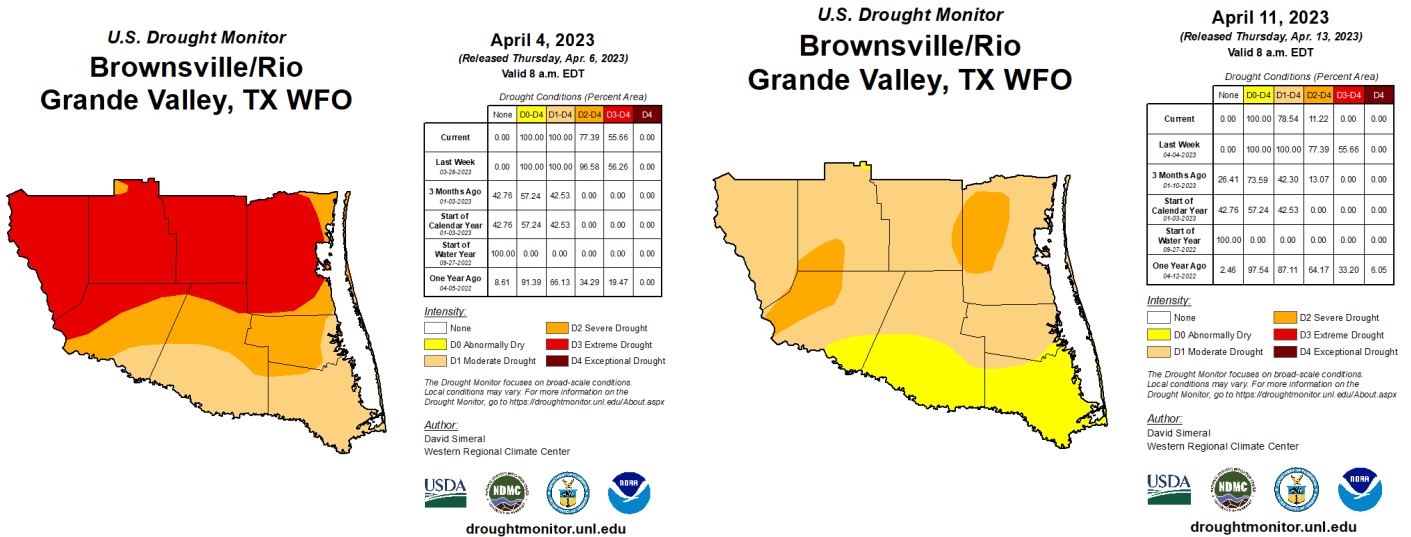


Figure 14. Drought monitor changes from prior to the April 6-8 rain event and after. Extreme (D3) Drought was eliminated across the Rio Grande Plains/Brush Country/Kenedy and Brooks ranches with a two-category improvement in many locations. For the entire area, at least a one-category improvement was realized.

Temperatures gradually recovered into mid-April, with drier fronts keeping readings from recovering much; highs in the mid to upper 90s occurred on the 15th.

Then the action began.

The persistent and speedy westerly flow aloft which had kept dry air dominant for much of winter through the end of March tilted a bit more southwesterly, coinciding with the natural increase in sun angle and mid-spring warming. At the same time, warm to very warm sea surface temperatures extending from the Gulf through the western Caribbean and coastal tropical Pacific Ocean along the southern Mexico through central American

coast helped “juice” the lower levels of the atmosphere with increasingly unstable air. On April 21st, the region saw its first severe weather coverage event – in the form of large to very large hail in several supercell/storm clusters that ripped through the region from northwest to southeast during the Friday afternoon commute. Two days later, a front cruising across south Texas acted on the reservoir of unstable air, with inflow of mid-level dry air providing momentum for wind gusts between 50 and 75 mph across much of the Lower Valley. The strongest winds were noted from Raymondville to Bayview, where some structural damage was noted to substandard/poorly anchored structures exposed to the northerly microburst, as well as hundreds of tree limbs felled.

April saved its worst for last, with another front linking up with a speedy jet streak and running into more unstable air from late evening of the 28th through the post-midnight hours of the 29th. A break-off cluster of mainly hailstorms in Starr and Zapata County during the mid-evening of the 28th organized into a small but potent squall line around midnight on the 29th. The squall line accelerated along/near the Rio Grande, across heavily populated Hidalgo County before rolling down the U.S./Mexico border region in Cameron County. Damage “worse than Hanna” struck hundreds of buildings, signs, power lines, trees and limbs on a line from near Mission/La Joya through McAllen and Pharr, continuing on the south side of Donna and Weslaco before hugging the Rio Grande along U.S. 281 in southwest Cameron County. When the damage is fully counted, it is likely that between \$50 and \$100 million in insured and uninsured damage from the 75 to 85-90 mph winds will be realized.

A full story on the events of late April 2023 for the Lower Valley can be found [here](#).

Each event brought more welcome rainfall that joined the unwelcome severe weather. Another 1 to 3+ inches fell across the Lower Rio Grande Valley region (Starr, Hidalgo, Willacy, Cameron) between the 28th and 30th, ensuring that continued drought improvements seen through mid-month would be able to hold through May. By the start of May, Abnormal Dryness (D0) was all that was left of the former D2 and D3 drought across the Brush Country, with the populated Valley now wet and green. Total monthly rainfall, which ranged from 4 to 8 inches across the southern tip of Texas (with a few pockets of 2 to 3” in northern Hidalgo and northern Zapata), ranked among the top ten wettest all-time for April. This included Brownsville (5.04”, 8th wettest) and McAllen (5.01”, 4th wettest).



Left: Large hail up to baseball size blew out this vehicle’s rear window near Peñitas on April 21st, 2023; large hail >2” in diameter was noted in the Mission/McAllen area as well as across the border in Reynosa, Tamaulipas, Mexico. Right: A flipped Cessna aircraft at McAllen/Miller Airport from the “midnight madness” of April 29th, 2023. Surface and top-floor wind gusts in this area were estimated at 80 to 90 mph. Left photo credit: Oscar Sobrevilla, Televisa Noreste (Mexico).

May continued the active pattern, with more upper level disturbances acting on increasingly warm/humid airmasses to create frequent squall line events through the month. While each event brought more helpful rain which would ultimately remove all dryness from the Deep S. Texas ranch country by early June, some of them came with a price that included more damaging winds and hail. The severe weather would persist into early June – rare for the Lower Rio Grande Valley.

A quiet but increasingly “soupy” start to May was rudely interrupted by a rapidly developing squall line that punched through southeast Hidalgo and Cameron County just after midnight on May 9th, [with 75 to nearly 90 mph winds raking Laguna Madre Bay and South Padre Island](#). Poorly fastened and exposed structures including an entire roof deck at an older condominium on Laguna Blvd., a partial roof deck at the South Padre Island Convention Center, and two recreational vehicles at Isla Blanca Park were impacted. Just four days later, a squall line raced across the Lower Valley, with outflow possibly impacting a “mini” supercell ahead of it. That supercell dropped an [EF1 Tornado on Laguna Heights](#) (near Port Isabel), with heavy impact to life and property. Tragically, one person died and eleven others were injured when very substandard buildings they resided in were demolished by the 85 to 105 mph wind; a total of 60 buildings sustained varying levels of damage in the community.

Heavy rainfall joined the squall line and attendant mesoscale convective system; the rain would continue through late morning and early afternoon across much of the Lower Valley, with another 1” to 3” adding to the monthly and seasonal total.

Additional rain fell with scattered to locally numerous thunderstorms through the next week, with another round of strong to severe thunderstorms on Memorial Day Weekend that dropped more mentionable hail, and 1.5” to more than 3” in portions of Hidalgo and Starr County.

May 2023, similar to April, ranked in the higher echelons of the overall period of record; Brownsville landed at 18th wettest (5.52”) and McAllen at 10th wettest (5.28”). Harlingen/Valley International Airport ended at 3rd wettest (6.42”) – though historical data is spotty at that location. Harlingen/cooperative landed at 23rd wettest (4.65”).



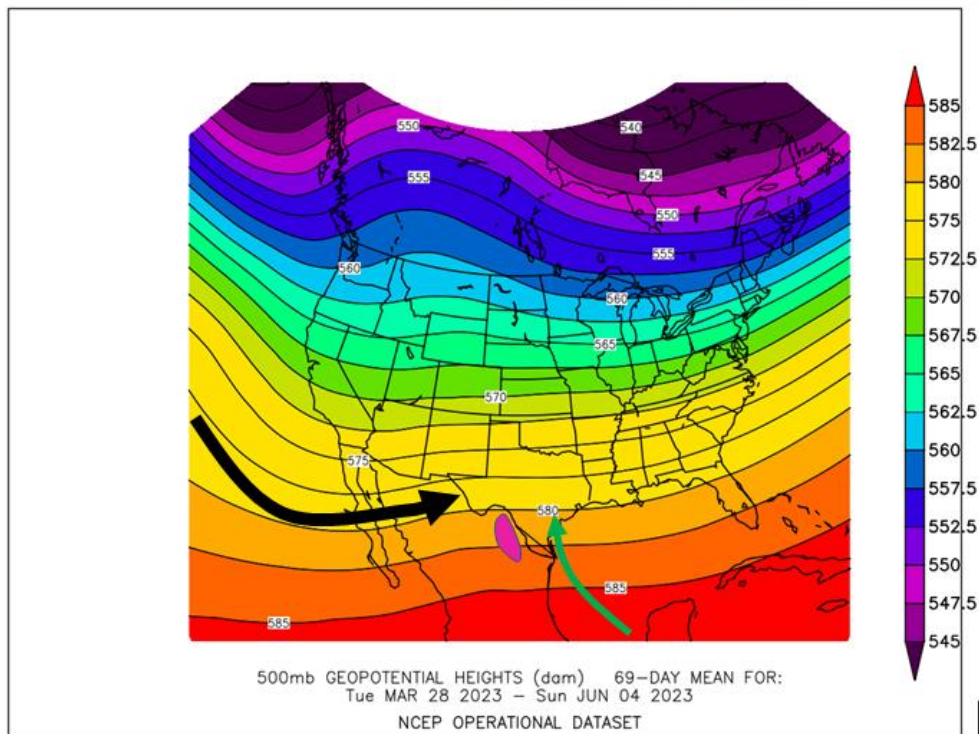
Left: Complete roof decking damage to the El Castile Condominium roof decking on South Padre Island, early on May 9th, 2023.
Right: Demolished very substandard/unanchored structures in Laguna Heights from an EF1 tornado early on May 13th, 2023.




Spring 2023 will go down as a tale of two seasons: A continuation of the warm and dry start to the year; as by mid-March temperatures ranked among the top ten warmest and rainfall among the top ten driest. Then, a rather abrupt change to much wetter conditions beginning on March 28th and continuing right into early June. The wetter conditions erased the drought/dryness across the far south Texas/Lower Rio Grande Valley region by the end of spring, but it came at a destructive and unfortunately deadly cost in one case (Laguna Heights).

The Pattern that Led to Rain and Storms

March 28 through June 4, 2023

Weather Forecast Office
Brownsville/Rio Grande Valley, TX



-  Upper level pattern (trough in the Southwest U.S.) that moved east and “lifted” increasingly warm/humid air into thunderstorm clusters or lines
-  Lower level increasingly warm/humid air in April-May being lifted by the upper level disturbances described above
-  Movement of thunderstorm lines/clusters at right angles to the mean flow in the upper levels (i.e. to the “right” of the flow, known as storm motion vectors).

Initial thunderstorms formed into a line/cluster along/just east of the Sierra Madre before surging southeast.

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Figure 15. General 500 mb steering pattern for the period of March 28 through June 24, when the bulk of the spring rain and thunderstorm events occurred across the Lower Rio Grande Valley region.

Between April 21 and the end of May, there were six individual severe weather episodes – each causing a combination of strong/damaging wind and hail for many locations across the Lower Rio Grande Valley:

- April 21 (afternoon): Large/very large hailstorm that developed originally in Jim Hogg County and moved into two clusters across the RGV, one in the McAllen/Mission metro and the other from west Harlingen south the Santa Maria/Los Indios/La Feria/Mercedes.
- April 23 (afternoon): South-moving squall line that produced welcome rain across the upper and lower Valley, and 47 to 68 mph wind gusts by early afternoon (measured). Strongest storms ripped from near Raymondville through Arroyo City/Rio Hondo, Los Fresnos, and Bayview, where we estimated wind speeds up to 75 mph.

- April 28/29 (overnight): Hail and some strong winds in Starr County morphed into a mini squall line that ripped across southern Hidalgo and southwest Cameron. Strongest winds, 75 to 85+ mph, occurred between 1215 and 115 AM (roughly) from La Joya/Penitas through McAllen, south side of Donna/Weslaco, Progreso, and into Santa Maria-Los Indios.
- May 9 (overnight): Rapidly intensifying mini squall line produced 75 to 90 mph wind gusts mainly on South Padre Island and the lower Laguna Madre nearby.
- May 13 (overnight; pre-dawn): Squall line produced lower wind speeds overall (25 to 37 mph), though higher toward the coast (40-50). Episode known for the Laguna Heights tornado (EF1) occurred just after 4 AM.
- May 29: Memorial Day wind/hail storms (afternoon)

Total property damage from all events in the period was likely to be well over \$100 million, which would be the most for a season since the legendary 2012 severe weather season, which included a six-week period of predominantly hail events, highlighted by the March 29, 2012 McAllen Hailstorm which alone resulted in several hundred million in property damage.

The good news? Farmers and ranchers had a very welcome reprieve from the water supply issue and drought impacts, and the temporary surplus gave renewed hope for a successful growing season – though an expected summer of dry and hot/very hot conditions could change the outcome from water-dependent dryland crops. The rainfall which continued through June 8th ended up high in the overall rankings (below), with Brownsville and McAllen ending up top-five wettest on record for the wet period, and Rio Grande City at 11th wettest. Shown is a slide for rainfall rankings through June 4th.

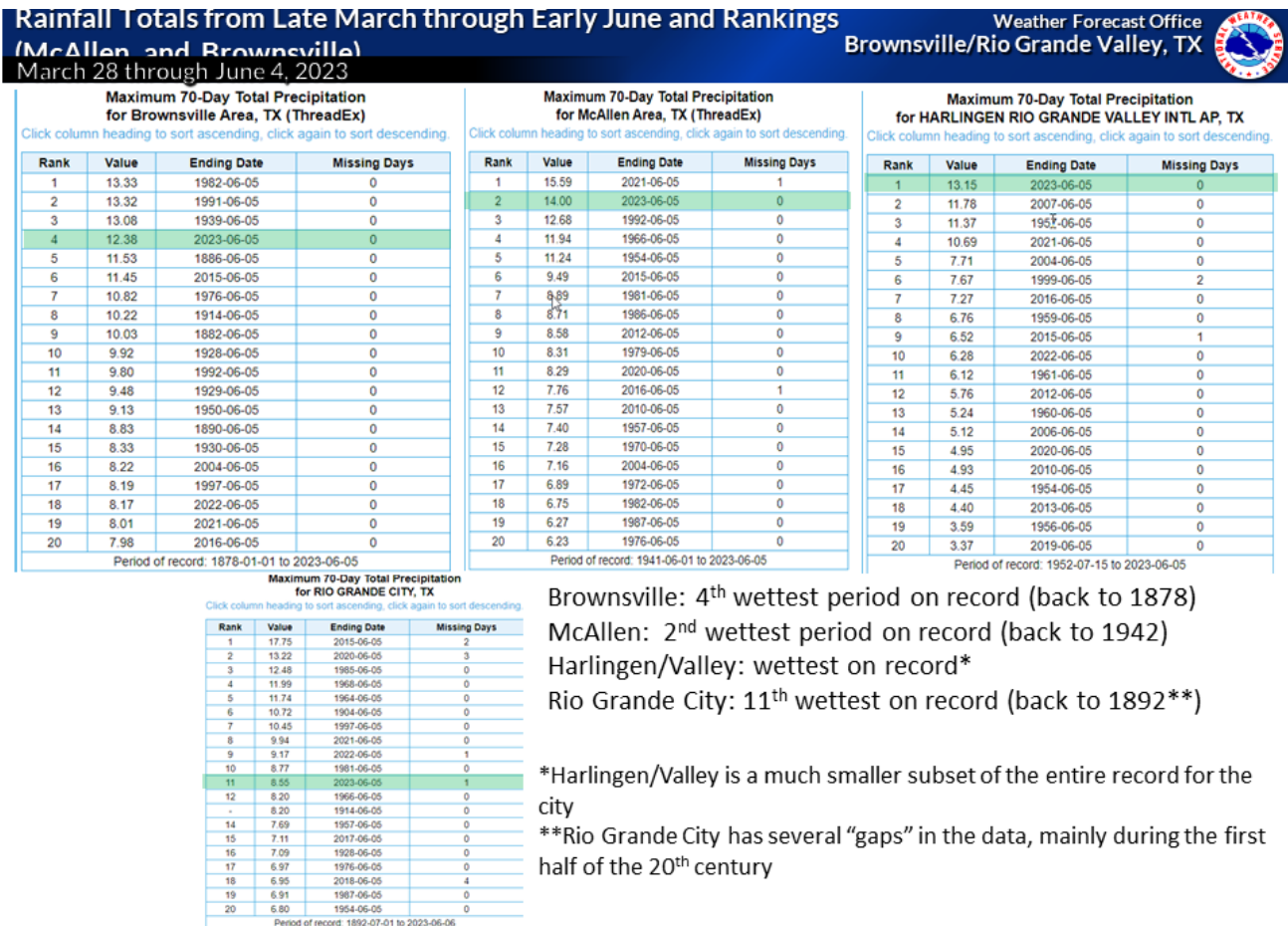


Figure 16. Measured rainfall and rankings for the spring into very early June 2023 wet period across the Lower Rio Grande Valley.

Summer 2023 may well revert the green gains to yellowing grass and brush – and a resumption of dryness and moderate (D1) drought. But the end of spring was quite a nice site of lush green landscapes, courtesy of the rainy pattern.

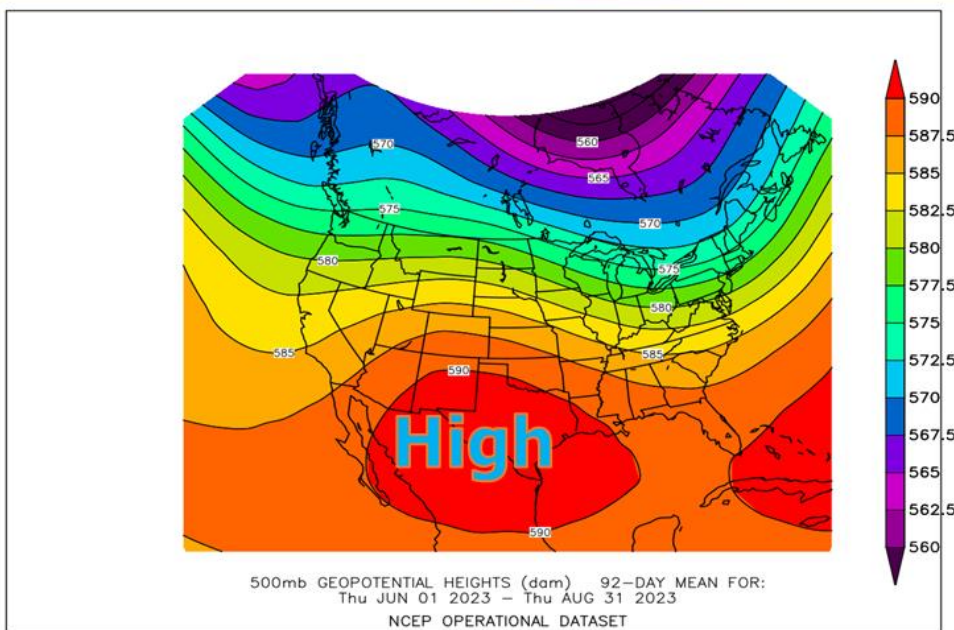


Green Streets: North Brownsville road bathed in green after multiple April rain events in 2023.

Rio Grande Valley Summer 2023 Review

Summer 2023 Weather Story for the Rio Grande Valley: Record Heat Brings Drought, Wildfire, and Water Supply Concerns Early June Storms Give Way to Summer Swelter and Loss of Soil Moisture

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



Underneath that "High":

- Record/Near Record Heat
- Dangerous Heat Index on Dozens of Days
- "Flash Drought" Began in Late June; Became Full Drought in July
- Wildfire spread July and August; Water restrictions in August

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Figure 17. The steering pattern at 500 mb across much of North America during summer 2023. The high pressure ridge, colloquially known as "La Canicula" in the Lower Rio Grande Valley, lasted for most of the summer. Also known as the "heat dome", the ridge was responsible for record to near-record heat across Texas and frequent strains on the power grid.

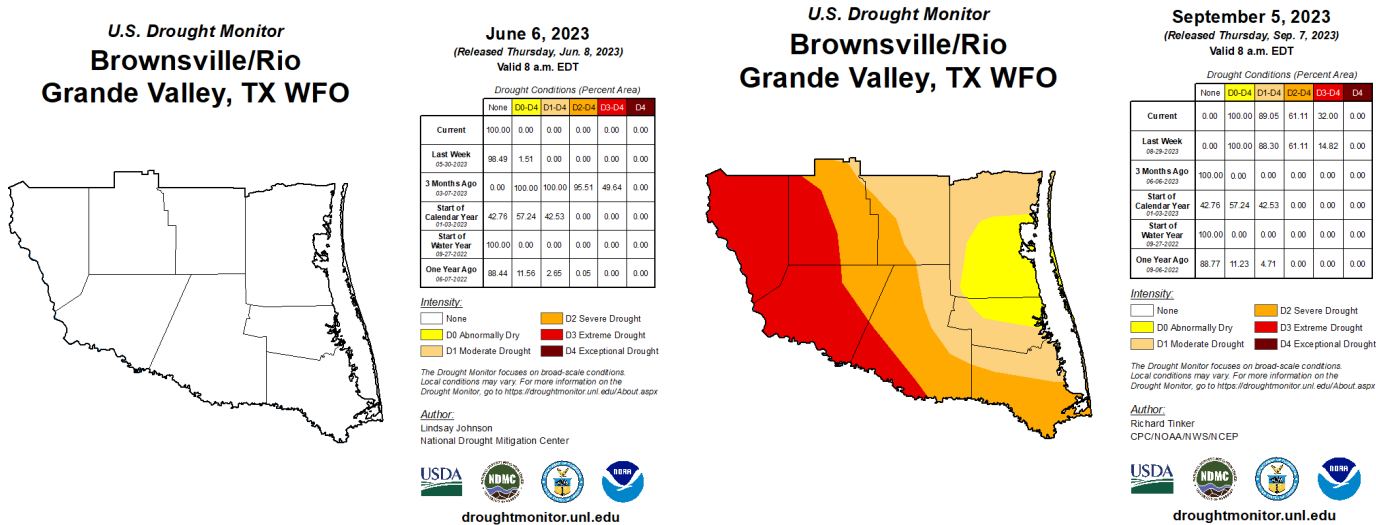


Figure 18: Near record rainfall between March 28 and June 8, 2023, eliminated drought and even brought local soil moisture surpluses. These were quickly evaporated as the hot and rain-free "heat dome" arrived on June 9th and persisted through the rest of summer. Limited rainfall, record heat, low humidity, and frequent wind brought Severe (Level 2) to Extreme (Level 3) Drought back

by the end of August across the populated Valley through the Brush Country. Rains from Tropical Storm Harold helped keep conditions a little better in Kenedy, Willacy, and Brooks County.

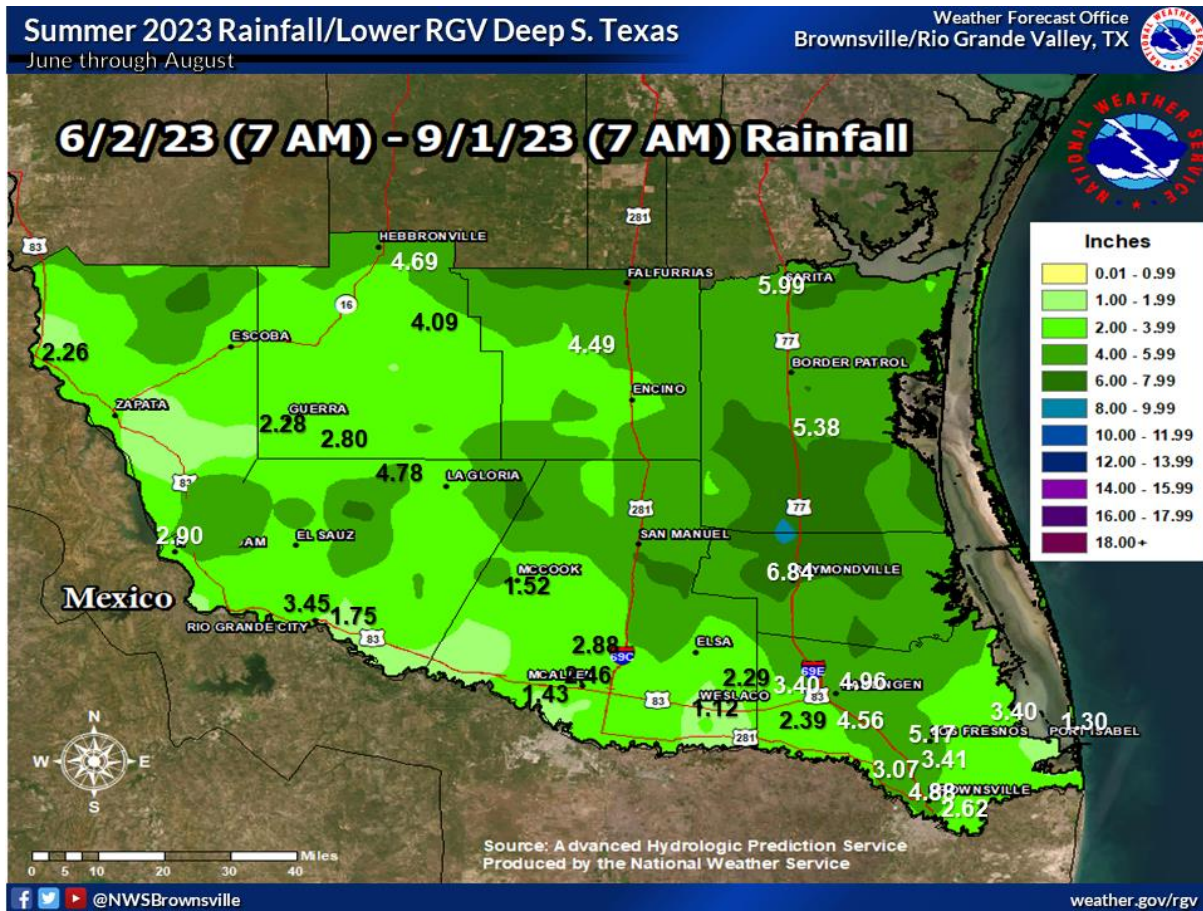
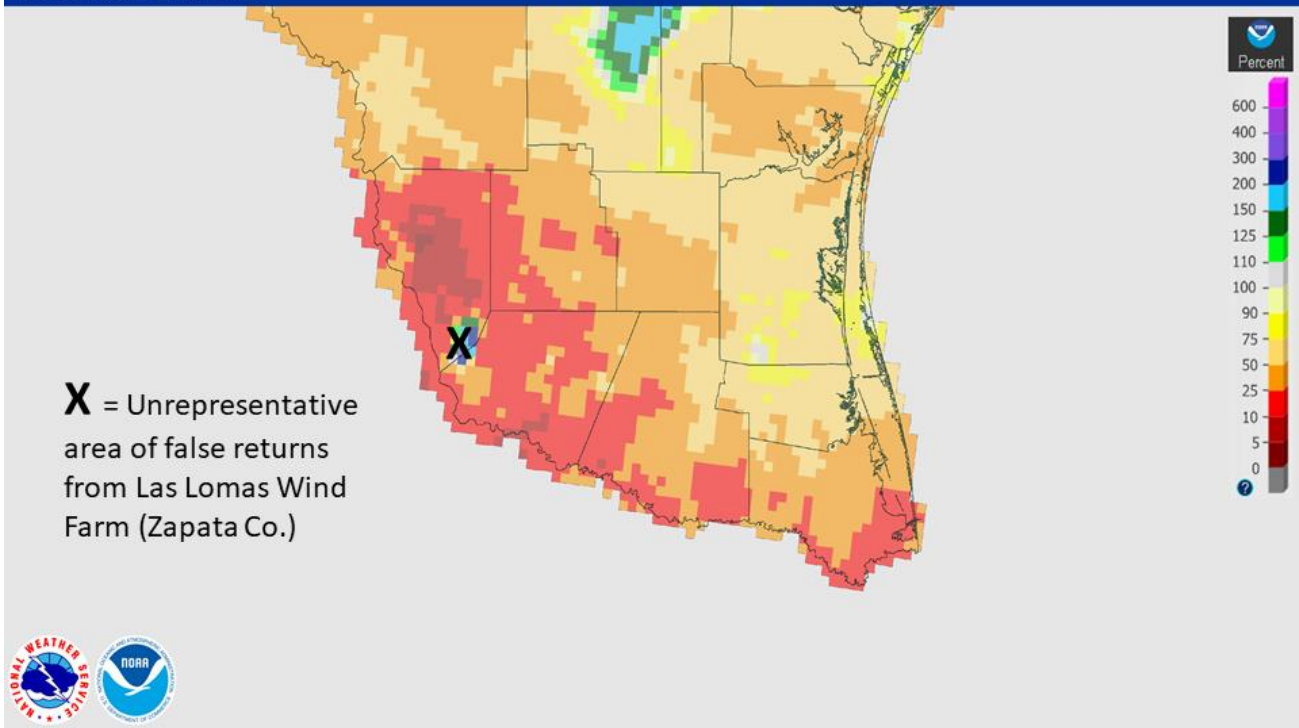


Figure 19. Annotated rainfall map for summer 2023 across the Lower Rio Grande Valley/Deep South Texas region.



September 09, 2023 90-Day Percent Precipitation

Created on: September 09, 2023 - 18:11 UTC
Valid on: September 09, 2023 12:00 UTC



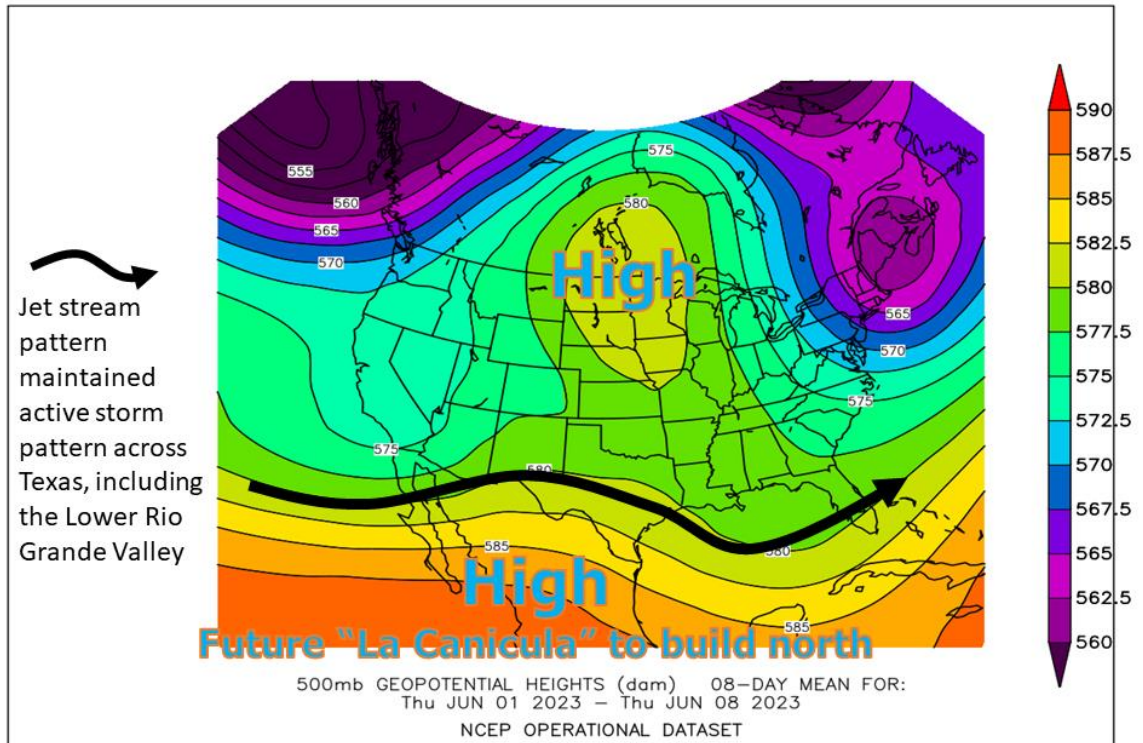
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Figure 20. Rainfall departure from average, June 11 through September 9, 2023. From Zapata County through the populated Interstate 2/IH 69E corridor, rainfall was less than 25 percent of average.

Month-by-Month Summary

June started where May left off: A few more upper level disturbances (below) in westerly flow aloft aided two squall lines (June 3 and early June 8) that bookended a two-afternoon window of locally severe thunderstorms mainly across Cameron County on the June 4 and 5. The additional rainfall closed out one of the wettest intra-spring periods on record (March 28-June 8; see the climate summary for spring 2023 for details). Strong winds up to 65 mph knocked down tree limbs, power lines, and a fireworks stand (below) on the 4th; hail between 1 and 2 inches in diameter fell between Rio Hondo, Harlingen, San Benito, and Brownsville. The last of the julian (March 20 through June 21) spring squall lines on the 8th raced across the Lower Valley, producing wind gusts between 53 and 60 mph in Cameron County and along the Lower Texas coast.



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Figure 21. 500 mb steering pattern for June 1-8, 2023. Frequent thunderstorm events occurred across the Lower Rio Grande Valley associated with embedded energy waves along and just south of the mid-level jet stream – notably on June 3, June 4-5, and June 8. The “La Canicula” ridge (lower left of image) would build quickly north by June 9th, and dominate the flow the rest of June – with the jet stream shifting well north of the region.



Above: Flipped fireworks stand in east San Benito, June 4, 2023, from wind gusts estimated at 60 mph. The stand was facing directly into the north wind and not securely anchored.

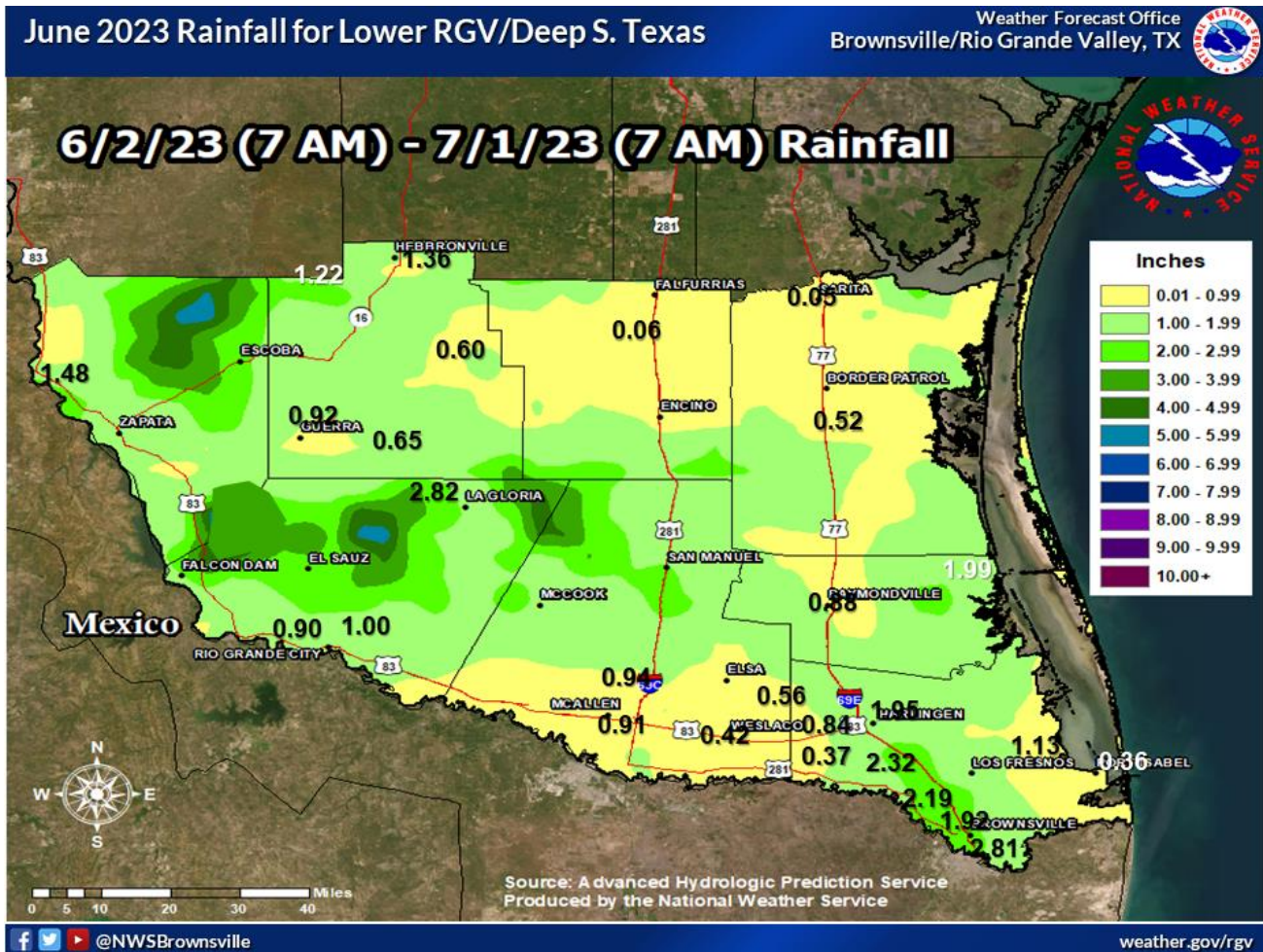


Figure 22. June 2023 rainfall for the Lower Rio Grande Valley/Deep S. Texas region. Nearly all of the rain fell between June 3 and June 8, before the “heat dome” took control

The steering pattern abruptly shifted on June 9th, as the 500 mb (around 18,000 feet above the ground) high pressure ridge built into the “La Canícula” position (Permian Basin Texas, southeast New Mexico, Coahuila and Chihuahua states, Mexico) (below) and would strengthen and persist, stretching eastward across central and south Texas for the remainder of June. The combination of an impressively hot atmosphere with surface southerly winds running over initially moist soils contributed to a prolonged – and unprecedented – period of excessive heat across the region, especially along and east of the Interstate 69C/US 281 corridor from Brooks/Hidalgo to the coast. Heat advisories (for heat index values of 111 or higher for 2 or more hours) were issued on nineteen occasions – daily -for all or parts of the Lower Valley/Deep South Texas ranch country beginning June 12th. Excessive heat **warnings** (for heat index of 116 or higher for 2 or more hours) were issued on six occasions. Based on prior research in 2009, heat advisories were generally expected to be issued for the southern tip of Texas between 3 and 6 times per year; excessive heat warnings were not truly considered. Nearly all of these hazards verified based on the local criteria; most impressive was the count of observations of **excessive heat** in June 2023, compared with other periods. Using McAllen as a proxy for the core of the Valley’s population, June 2023 had an **eleven-day streak of heat index of 116 or higher** (June 13th through 23rd) and a monthly total of 12 days. No other Junes in the modern record came close to the 2023 benchmark; most recently, the hot June of 2019 had three consecutive days (June 7-9) and four days in total in McAllen.

New monthly average temperatures were recorded for several Valley locations, including Brownsville, Harlingen, and Port Mansfield. The frequent excessive heat took its toll on people – as there was little time for

the region to acclimate to mid-summer (or even hotter) conditions following the wet spring which featured a number of comfortable evenings and mornings. Most days between June 12 and 30 had long-duration heat index above 90 through the night. All of this contributed to an 11 to 18 percent increase in heat-related hospitalizations (ER visits) compared with the near-record hot June of 2022, and there was one known indirect heat-related death in San Benito on the 25th.

For agriculture, the boon of a wet Julian spring was wiped out by the three weeks of record heat under a very strong “La Canícula” heat dome. Flash drought began at the end of June, as growers and livestock owners began seeing sharp declines in crop growth. The USDA Farm Services Agency (FSA) extension agent who serves ranch and livestock communities across the southern tip of Texas reported crispy pastures devoid of soil moisture and dried/drying up stock ponds by the end of June – more akin to a longer-term Extreme or Exceptional Drought.

July was a continuation of June, with above average temperatures dominating the month – though departures from average shrunk a bit given that July includes a portion of the hottest period (July 25-31) on the calendar. A weak tropical wave loitering near the mid and lower Texas coast between July 5 and 7 produced decent rain across the Gulf, and pockets of heavy rainfall reached land, especially on the 6th – where morning through early afternoon showers and thunderstorms dropped an estimated 1 to 2 inches (or more) in northern Willacy and southern Kenedy County. The early month rains staved off dryness and drought in these areas, but locations across the Rio Grande Plains and Brush Country were not as fortunate. No rain fell there, and by the start of August, pockets of dryness had turned to Severe (Level 2 of 4) Drought. The early month rains farther east were overcome by the aforementioned heat and lack of rain after the 7th, and Level 0 (abnormal dryness) arrived by August 1st.

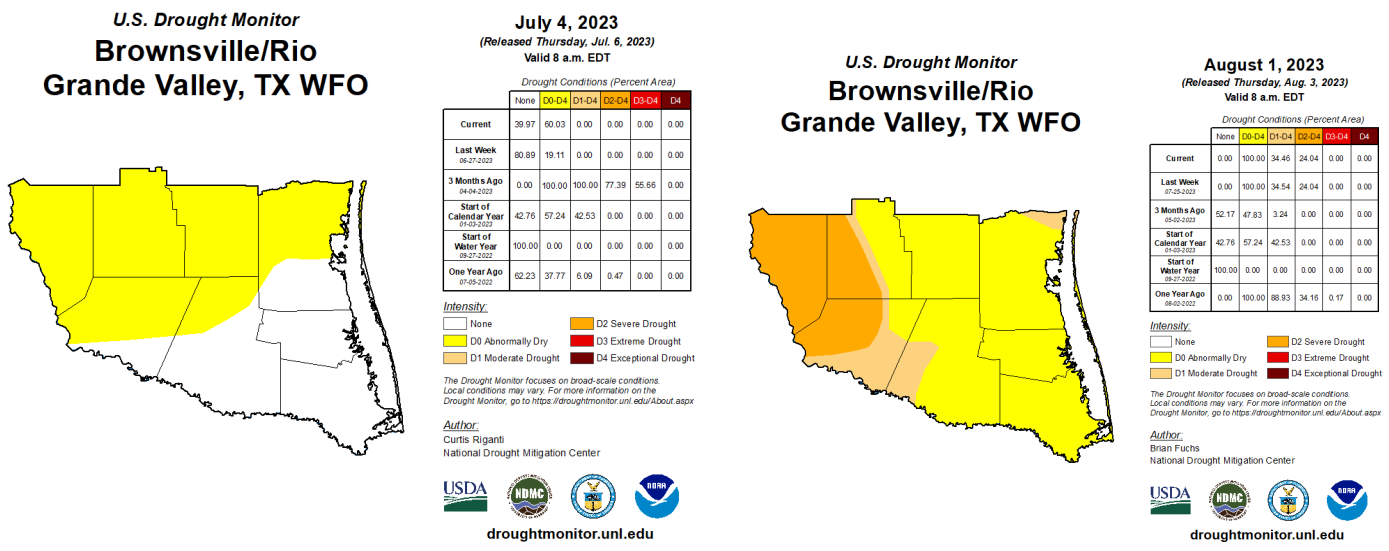


Figure 23. Dryness/Drought Comparison between July 4 and August 1, 2023. Severe (Level 2) and Moderate (Level 1) Drought developed rapidly in July as pastures, brush, and livestock and various detention ponds dried up considerably. While the long-term drought indicators were at the low end of the scale, flash drought was severely impacting livestock managers and crop growers – including cotton – with crop production reduction and water transport necessary for livestock.



Above: Rapidly developing dryness, or Flash Drought, shown north of Harlingen on July 26th (left) and August 5th (right). Photo credits: Dale Murden, Texas Citrus Mutual.

For the combination of June and July, Brownsville (since 1878), Harlingen (since 1912) and Port Mansfield (since 1958) had new heat records, with all other available Valley locations falling in the top five warmest – except McAllen (since 1942), which was several degrees behind 2009’s benchmark.

The rapidly parched landscape – especially grasslands and brush that had grown thicker during the March 28-June 8 near-record spring wet period – was ready to burn at the (literal) drop of a match, and several notable wildfires were reported in July across the Brush Country. The “Cage” wildfire burned 111 acres on July 13th - 16th in northern Brooks County. The larger “Florida” fire southeast of Hebbronville (Jim Hogg County) burned nearly 1600 acres on July 19th-20th, part of a busy wildfire day in the Brush Country, where a second large wildfire (“Waggner”) burned more than a thousand acres on the same dates.

August continued the “heat beat” for nearly the first three weeks of the month, with drought worsening. Extreme (Level 3 of 4) Drought developed in Zapata and Jim Hogg County, and Severe (Level 2 of 4) Drought covered all but an area near the coast (Willacy, southern Kenedy, northern Cameron). Dryland crops and livestock continued to suffer under the persistent heat wave, as the “heat dome” was unrelenting. The ridge of high pressure did expand and shift east and northward, into the southern Plains and extending across much of the Gulf states. Though the ridge expanded, its southern extent continued across all of Texas, keeping any rain at bay while dry ground enhanced the conversion of short wave insolation into heat, rather than a combination of heat and evapotranspiration, with nearly all rangeland brown and “crispy”.

The continued worsening drought and fuel dryness contributed to the rapid spread of additional wildfires in August from the Rio Grande Plains to the Lower Rio Grande Valley. The largest wildfire of the year so far (“Jennings”) burned 3500 acres on central Zapata brush and grassland between August 7th and 9th, and the Granjeno grass fire, near the Rio Grande south of Mission, burned 970 acres between August 10th and 12th. Photos of each are shown below. At least two, if not more, of the wildfires were human-caused. Often, this is not intentional – but in each case, wildfire prevention techniques may not have been applied, despite the combination of heat, critically dry fuels, low to moderate humidity, and occasionally gusty winds.



Above: Two wildfires grew rapidly across the Rio Grande Plains (left) and Lower Rio Grande Valley (right) in mid August – a month that typically does not see the same type of wildfire growth threat as those in spring. Critically dry fuels, hot temperatures low humidity, and gusty afternoon winds all contributed to the rapid spread of these and other summer wildfires.

At the end of the period (August 21), the core of the ridge was located over the mid-Mississippi Valley, and extended east through the mid Atlantic and southeast U.S. coast. Easterly flow underneath the ridge combined with a tropical disturbance embedded within to produce an area of moisture, which headed west at a decent pace. Early on August 22, the wave developed sufficiently – including a low level circulation – to be named Tropical Storm Harold. Harold was a diffuse cyclone until just before landfall at 10 AM on the 22nd along the mid-Kenedy County barrier island. “Setup” rainfall on the 21st was minimal, but the outer bands moved onshore after midnight on the 22nd and provided welcome rain, especially to Kenedy, Willacy, and western Cameron County. Just after daybreak, however, Harold’s circulation consolidated – and a “dry slot” on its southwestern flank ran across the populated Rio Grande Valley over the Zapata County. While there was rain everywhere, the event rainfall was paltry compared with locations along and north of the center of circulation. That center moved through central Kenedy, southern and central Brooks, and northern Jim Hogg County before exiting the Deep South Texas ranch country into the Laredo area. Harold, racing along at 21 mph, was unable to produce the precipitation needed to truly dent the drought in the populated Lower Rio Grande Valley – through the 2 to 3.7 inches that fell from northeast Willacy through Kenedy, northern Brooks, and Hebbronville (Jim Hogg, far northeast corner) did help there. A final feeder band of showers rolled through the lower Valley early on the 23rd, before hot and dry air returned. An abbreviated data summary for Tropical Storm Harold in the Lower Valley/Deep South Texas region can be found [here](#).

Rainfall Associated with Tropical Storm Harold

August 21-23, 2023

Weather Forecast Office
Brownsville/Rio Grande Valley, TX



8/21/23 (7 AM) - 8/23/23 (7 AM) Rainfall

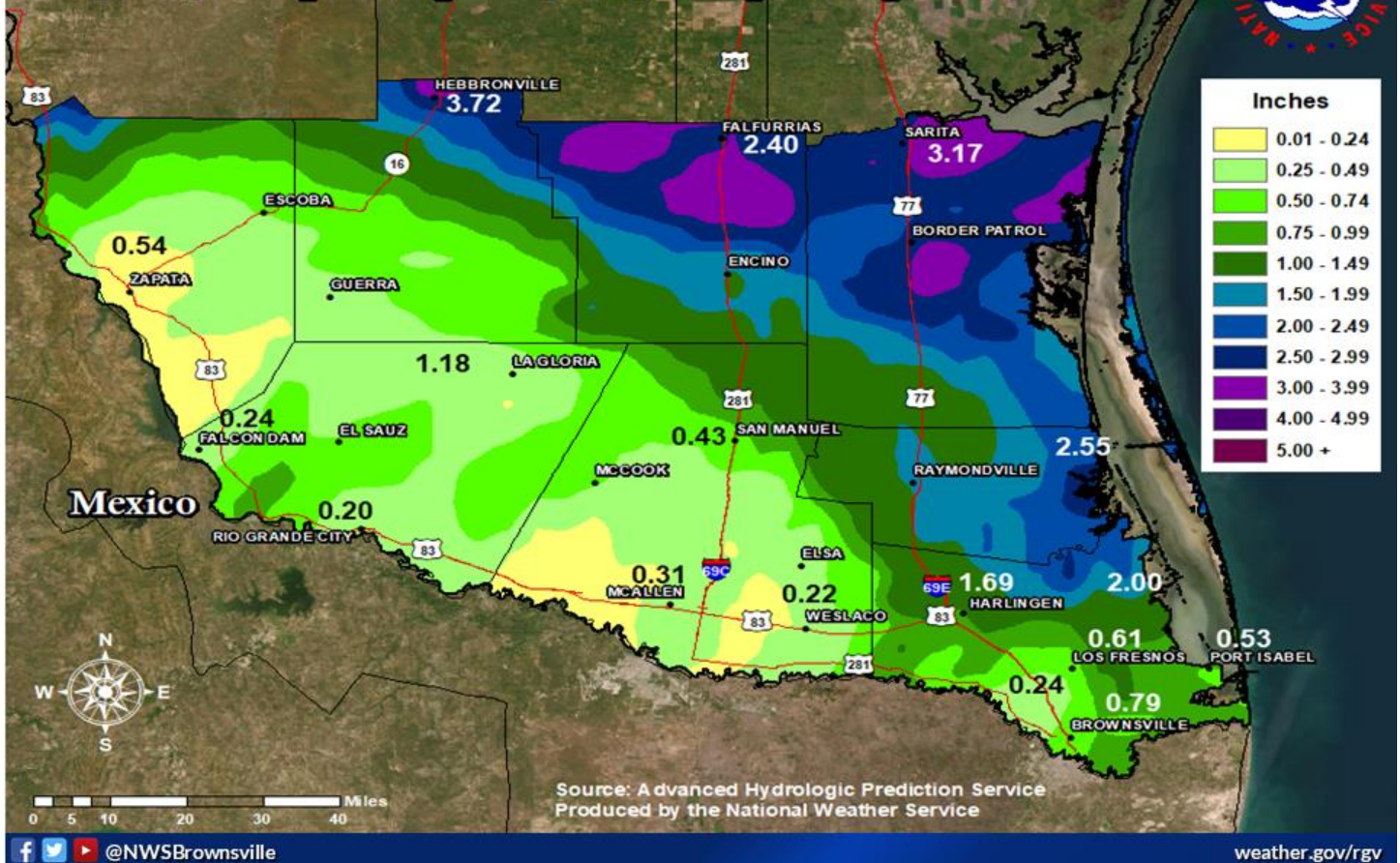


Figure 24: Rainfall associated with Tropical Storm Harold and a feeder band following the storm (early August 23). The center made landfall about 35 miles north of Port Mansfield (Kenedy barrier island) and tracked through central Brooks County and northern Jim Hogg before exiting the local region into Webb County. CoCoRaHS observers in Port Mansfield and Jim Hogg county provided helpful rainfall observations.

Summer overall will be rightfully remembered as the year of the “heat dome” – or, as locals ascribe, “La Canícula” that never ended (and continued deep into September to boot). While other summers have seen extended “Canícula” periods (the astronomical period is July 3 through August 11), the early onset, timed with the Julian solstice, made it that much worse for people, pets, livestock, and crops. There will be a notable financial impact of the reduced production and or loss of dryland crops or crops that were unable to be irrigated due to late season water supply issues, and those numbers will be available in autumn.

Statistically, summer ranked within the top five hottest on record – some records dating back more than a century – for all available Lower Rio Grande Valley locations. All but McAllen landed at the top of the heap (below), and with above average temperatures likely for the rest of the calendar year, the region is almost certain to see top five annual temperatures as well. Finally, the number of 100 degree days are staggering across the board, with Brownsville and Harlingen setting new summer records, and McAllen falling just shy of the blistering overall summer – especially July and August – of 2009.

Finally, for a second summer in a row, water storage levels at Falcon International Reservoir remained very low – and by August, an increasing number of municipalities instituted Stage 2 conservation rules based on the

percentage of Amistad-Falcon falling below 25 percent. During the week prior to Harold, the USA share bottomed out at 23.1 percent. And, while Harold provide some water the the Lower Rio Grande basin watershed headwaters, it was a figurative “drop in the bucket” as values rose from 14.6 percent only back to 15.3 percent; with “La Canícula” dominating into September, with triple digit heat, low humidity, and high evaporation rates along the Sierra Madre foothills, the value fell back to 14.7 percent by September 11. Without a tropical cyclone in early autumn, the reservoirs are assured to remain at very to critically low levels through most of autumn.

“La Canícula’s” Dominance Creates Record Summer Heat

Weather Forecast Office
Brownsville/Rio Grande Valley, TX



Average Valley Summer Temperatures/Rankings, 2023

Maximum 3-Month Mean Avg Temperature for Brownsville Area, TX (ThreadEx)				Maximum 3-Month Mean Avg Temperature for HARLINGEN, TX				Maximum 3-Month Mean Avg Temperature for McAllen Area, TX (ThreadEx)			
Rank	Value	Ending Date	Missing Days	Rank	Value	Ending Date	Missing Days	Rank	Value	Ending Date	Missing Days
1	88.6	2023-08-31	0	1	88.6	2023-08-31	4	1	90.8	2009-08-31	0
2	87.9	2019-08-31	0	2	88.0	2019-08-31	8	2	90.1	2017-08-31	0
3	87.5	2018-08-31	0	3	87.9	1998-08-31	4	3	90.0	2018-08-31	3
4	87.2	2022-08-31	0	4	87.2	2022-08-31	0	4	89.9	1998-08-31	2
5	86.9	1998-08-31	0	5	87.1	2016-08-31	5	5	89.6	2016-08-31	0
6	86.4	1980-08-31	0	6	86.9	2018-08-31	12	6	89.5	2023-08-31	0
7	86.3	1982-08-31	0	7	86.8	2009-08-31	5	7	89.3	2019-08-31	0
8	86.1	2012-08-31	0	8	86.7	2017-08-31	7	8	88.8	2012-08-31	0
9	86.0	2005-08-31	0	9	86.5	2020-08-31	7	9	88.5	2015-08-31	0
10	86.0	2001-08-31	0	10	86.4	2005-08-31	0	10	88.2	2022-08-31	0

Period of record: 1878-01-01 to 2023-09-08

Period of record: 1912-02-07 to 2023-09-09

Period of record: 1941-06-01 to 2023-09-08

Maximum 3-Month Mean Avg Temperature for RAYMONDVILLE, TX			
Rank	Value	Ending Date	Missing Days
1	88.5	2023-08-31	10
2	88.2	1998-08-31	3
3	88.0	1947-08-31	0
4	87.7	1953-08-31	0
5	87.1	1980-08-31	3
6	86.8	2009-08-31	4
7	86.8	2022-08-31	13
8	86.5	1969-08-31	0
9	86.5	2005-08-31	2
10	86.5	1982-08-31	0

Period of record: 1913-01-01 to 2023-09-08

Maximum 3-Month Mean Avg Temperature for RIO GRANDE CITY, TX			
Rank	Value	Ending Date	Missing Days
1	90.0	2023-08-31	2
2	89.4	2009-08-31	2
3	89.3	1996-08-31	5
4	89.0	1997-08-31	7
5	89.0	1901-08-31	0
6	88.9	2022-08-31	4
7	88.8	1999-08-31	5
8	88.8	2001-08-31	13
9	88.8	2019-08-31	2
10	88.7	1928-08-31	0

Period of record: 1897-01-01 to 2023-09-09

Tale of the Tape: Summer (June-August) 2023

- Brownsville (since 1878) - **#1**, 0.7 degrees **above** prior record (2019)
- Harlingen (since 1912) - **#1**, 0.6 degrees **above** prior record (2019)
- McAllen (since 1941) - **#6**, 1.3 degrees **below** record (2009)
- Raymondville (since 1913) - **#1**, 0.3 degrees **above** prior record (1998)
- Rio Grande City (since 1897) - **#1**, 0.6 degrees **above** prior record (2009)

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Figure 25: Top ten temperature (day and night combined) temperature rankings, summer (June-August) 2023, for available Lower Rio Grande Valley locations. Only McAllen (6th hottest) was not ranked number 1.

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

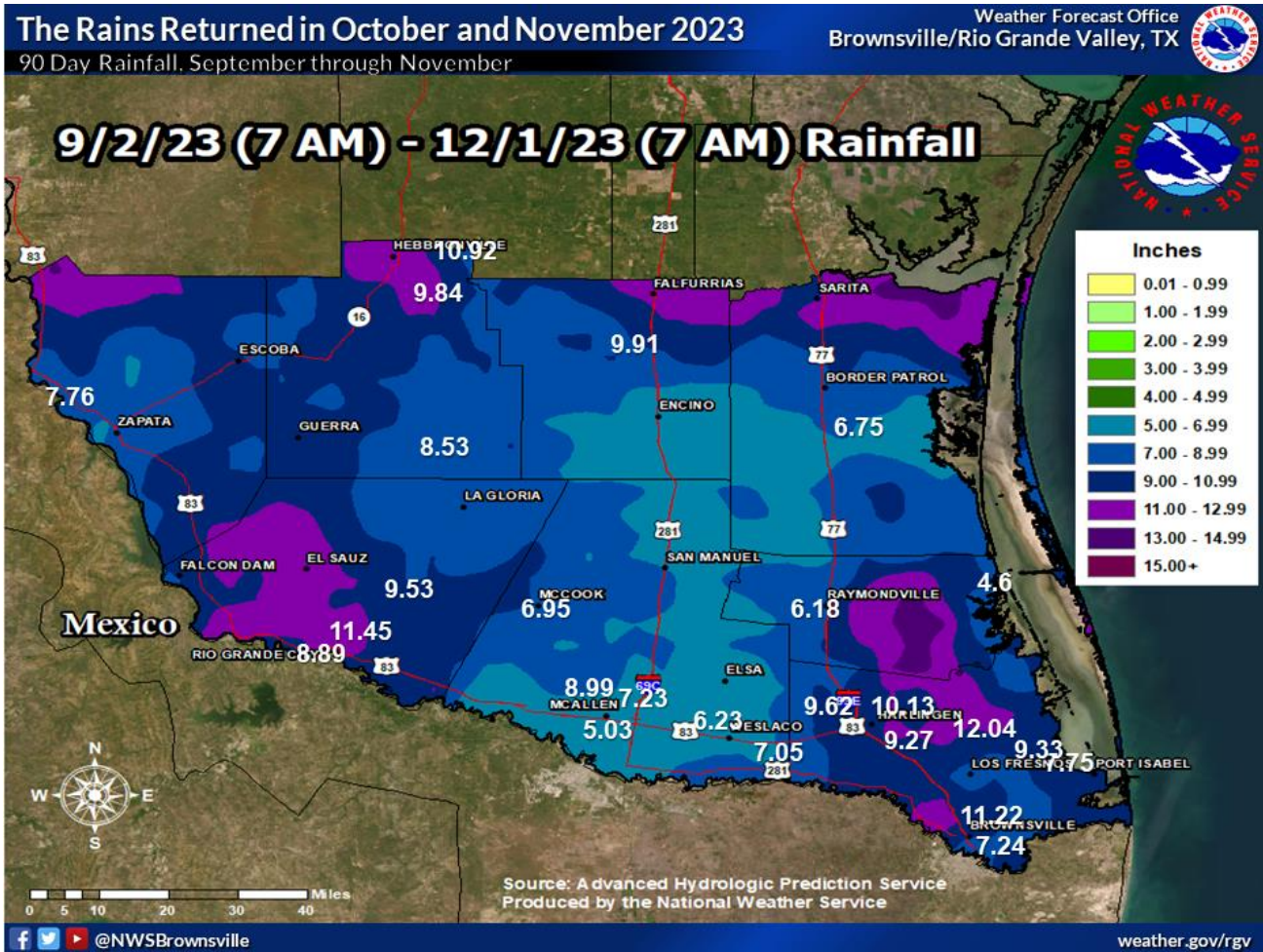


Figure 26. After a searing hot summer, which stretched into meteorological autumn (September and early October), the rains finally came in multiple events – first, thunderstorms east and west on October 5th, and more definitively, on Veterans Day Weekend (November 10-14) .

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

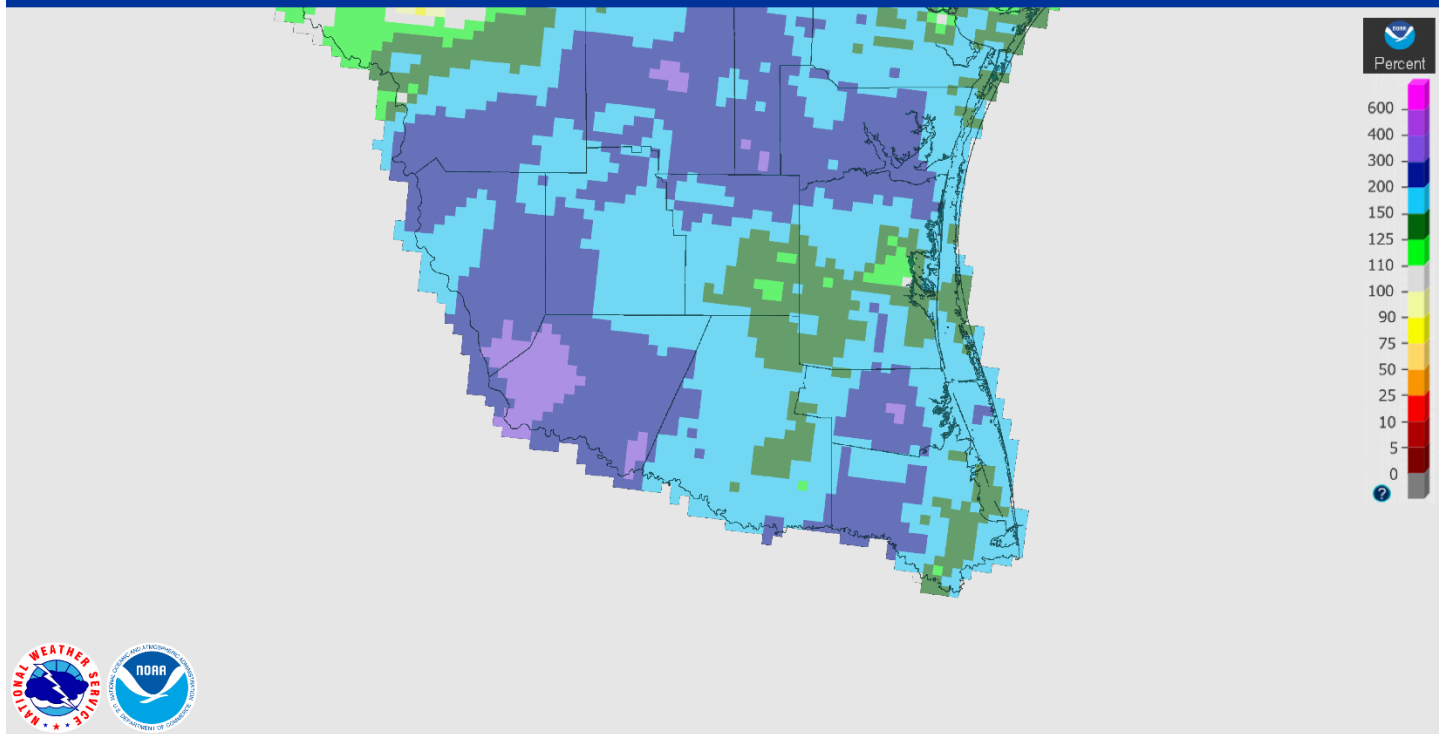
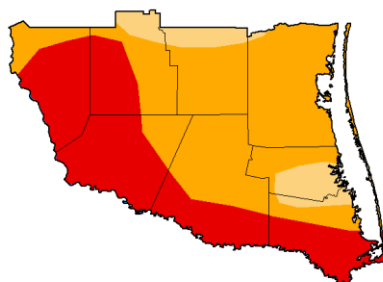


Figure 27 From the start of the water year (October 1) through the end of November, all regions of the Rio Grande Valley/Deep S. Texas Brush/Ranch country saw above average rainfall. The highest departures, two to more than four times average, occurred across the upper Valley/Rio Grande Plains, the lower 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
- D0 Abnormally Dry
- D1 Moderate Drought
- D2 Severe Drought
- D3 Extreme Drought
- D4 Exceptional Drought

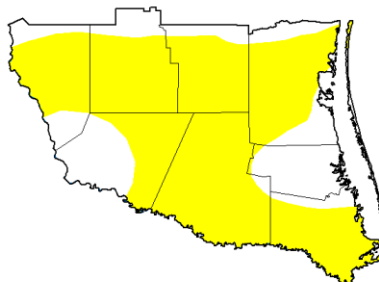
The Drought Monitor focuses on broad-scale conditions. Local conditions may vary. For more information on the Drought Monitor, go to <https://droughtmonitor.unl.edu/about.aspx>

Author:
Brad Plugh
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	88.30	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
- D0 Abnormally Dry
- D1 Moderate Drought
- D2 Severe Drought
- D3 Extreme Drought
- D4 Exceptional Drought

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 28: 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” 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 29). That same pattern severely limited rainfall, with most areas at 10-25 percent of the monthly average (Figure 31). 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 30).

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”, 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 29. 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+

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Figure 30. 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.

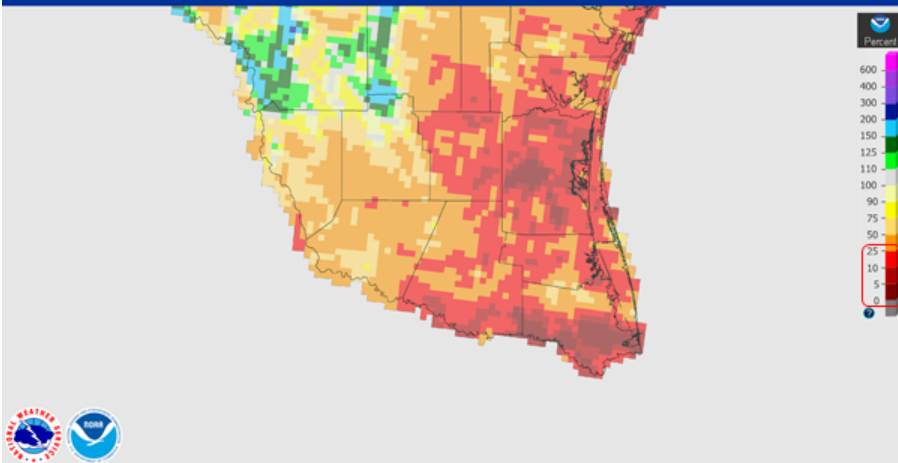
Dryness Joined the Heat in September 2023

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 31. 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"+ and local flooding in Cameron and Willacy County (Figure 32), with later evening heavy rains draping the Rio Grande Plains and upper Valley/Brush Country with 1-2" prior to the season's first cooling front. Additional rains October 10th dropped between 0.5" and 1.5" 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" east of the populated areas there) – but still 50 to 90 percent of average in between.



Oct 5, 2023 at 4:11:12 PM
1066-1082 Mexico Blvd
Stormwater Inspections



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.

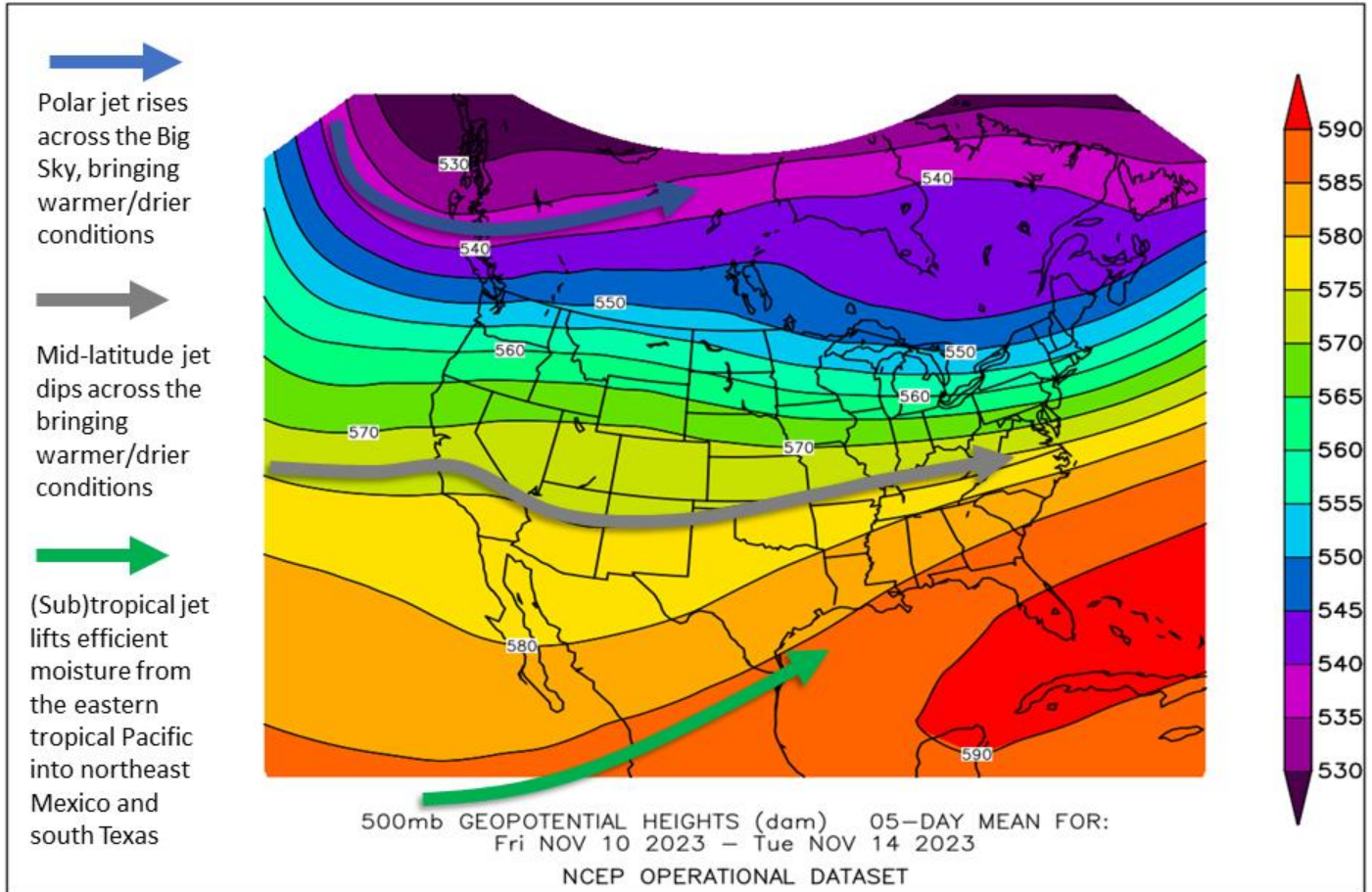
November temperatures initially recovered following the Halloween cold snap, with seasonably warm readings and no rainfall. A flat upper-level high pressure ridge than was overtaken by a mid-latitude energy impulse which had a “tap” into the eastern tropical Pacific – the “classic” El Niño pattern (Figure 33). 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” across the entire region (Figure 34), 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



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Figure 33. 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 34: 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.

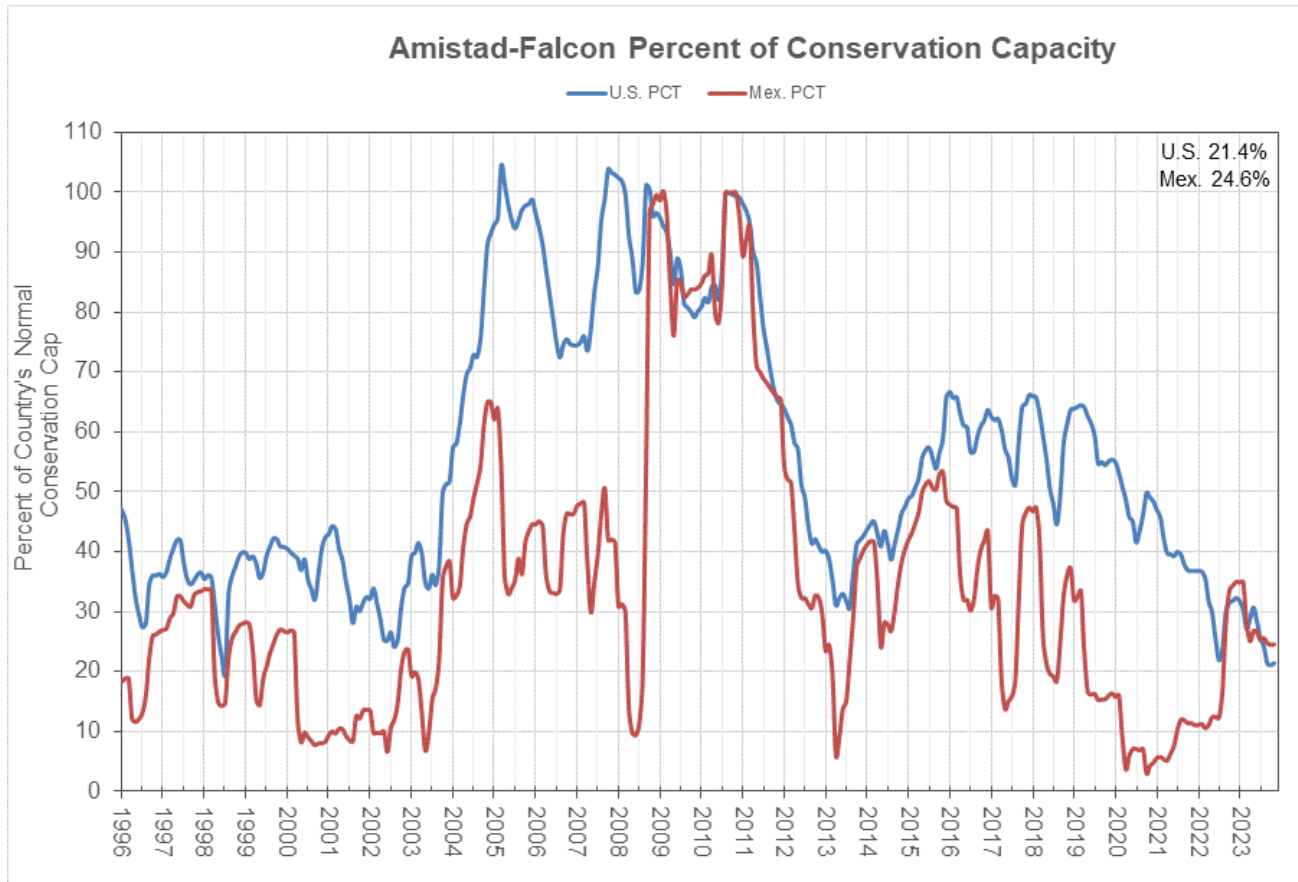


Figure 35. Percent of Conservation (ownership) Capacity for the US and Mexico, Amistad minus Falcon International Reservoirs. Since mid-summer, the US percentage remained below 25 percent, maintaining Stage 2 water conservation rules in more than a half-dozen Valley communities. The value of 21.4 percent 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.

December, perhaps fittingly, gave the Rio Grande Valley a welcome break from a year of ups and downs, dry and wet, stormy and steamy hot. For many, the month represented the wonder of the region, weather-wise – an escape from the cold and winds that arrive elsewhere in the U.S. About the only item of note was the month was the return of dryness for all but a few pockets in Brooks County and near the Cameron County coast. That dryness, however, came with modest fronts that kept a lid on otherwise slightly warmer than average temperatures. Moderate Drought and Abnormal Dryness was eliminated in early December, not to return for the rest of the year.