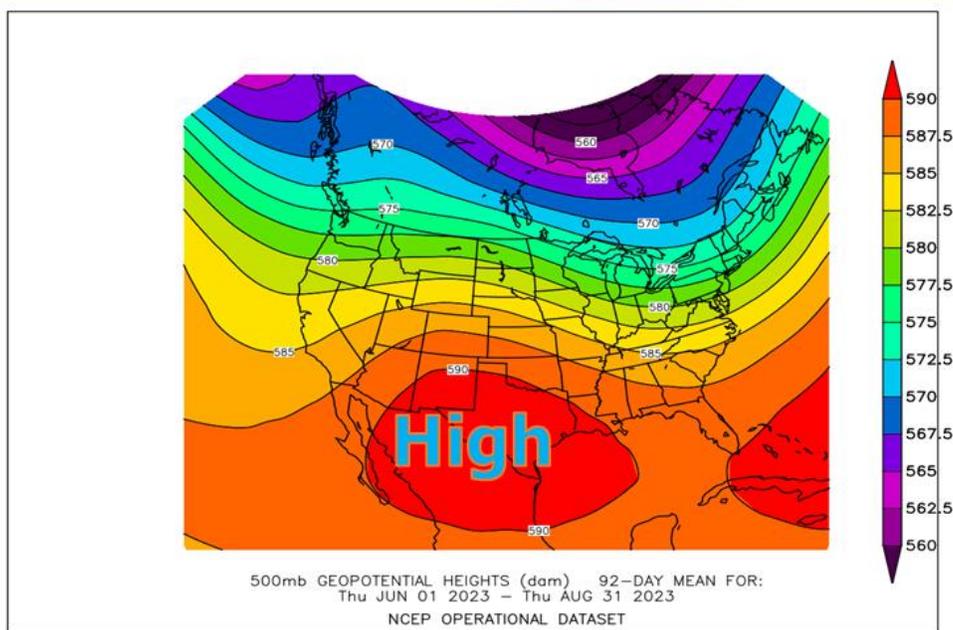


Rio Grande Valley Summer 2023 Review

**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

The Pattern of “La Canicula” – Summer 2023 Weather Forecast Office
Brownsville/Rio Grande Valley, TX 



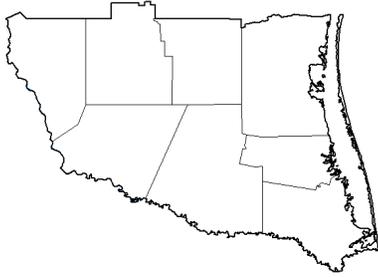
Underneath that “High”:

- 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

 @NWSBrownsville weather.gov/rgv

Figure 1. 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.

**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 (05-29-2023)	98.49	1.51	0.00	0.00	0.00	0.00
3 Months Ago (04-15-2023)	0.00	100.00	100.00	95.51	49.64	0.00
Start of Calendar Year (01-01-2023)	42.75	57.24	42.53	0.00	0.00	0.00
Start of Water Year (09-01-2022)	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) D2 Severe Drought (Orange)
 D0 Abnormally Dry (Yellow) D3 Extreme Drought (Red)
 D1 Moderate Drought (Light Orange) D4 Exceptional Drought (Dark Red)

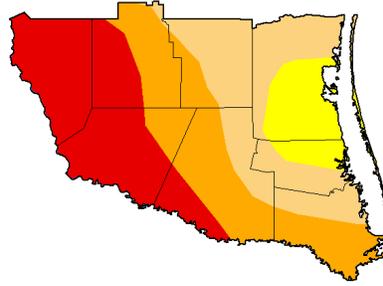
The Drought Monitor focuses on broad-scale conditions. Local conditions may vary. For more information on the Drought Monitor, go to <https://droughtmonitor.unl.edu/About.aspx>

Author:
Lindsay Johnson
National Drought Mitigation Center



droughtmonitor.unl.edu

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



September 5, 2023
(Released Thursday, Sep. 7, 2023)
Valid 8 a.m. EDT

	Drought Conditions (Percent Area)					
	None	D0-D4	D1-D4	D2-D4	D3-D4	D4
Current	0.00	100.00	89.05	61.11	32.00	0.00
Last Week (08-29-2023)	0.00	100.00	88.30	61.11	14.82	0.00
3 Months Ago (06-06-2023)	100.00	0.00	0.00	0.00	0.00	0.00
Start of Calendar Year (01-01-2023)	42.75	57.24	42.53	0.00	0.00	0.00
Start of Water Year (09-01-2022)	100.00	0.00	0.00	0.00	0.00	0.00
One Year Ago (06-06-2022)	88.77	11.23	4.71	0.00	0.00	0.00

Intensity:
 None (White) D2 Severe Drought (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:
Richard Tinker
CPC/NOAA/NWSINCEP



droughtmonitor.unl.edu

Figure 2: 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.

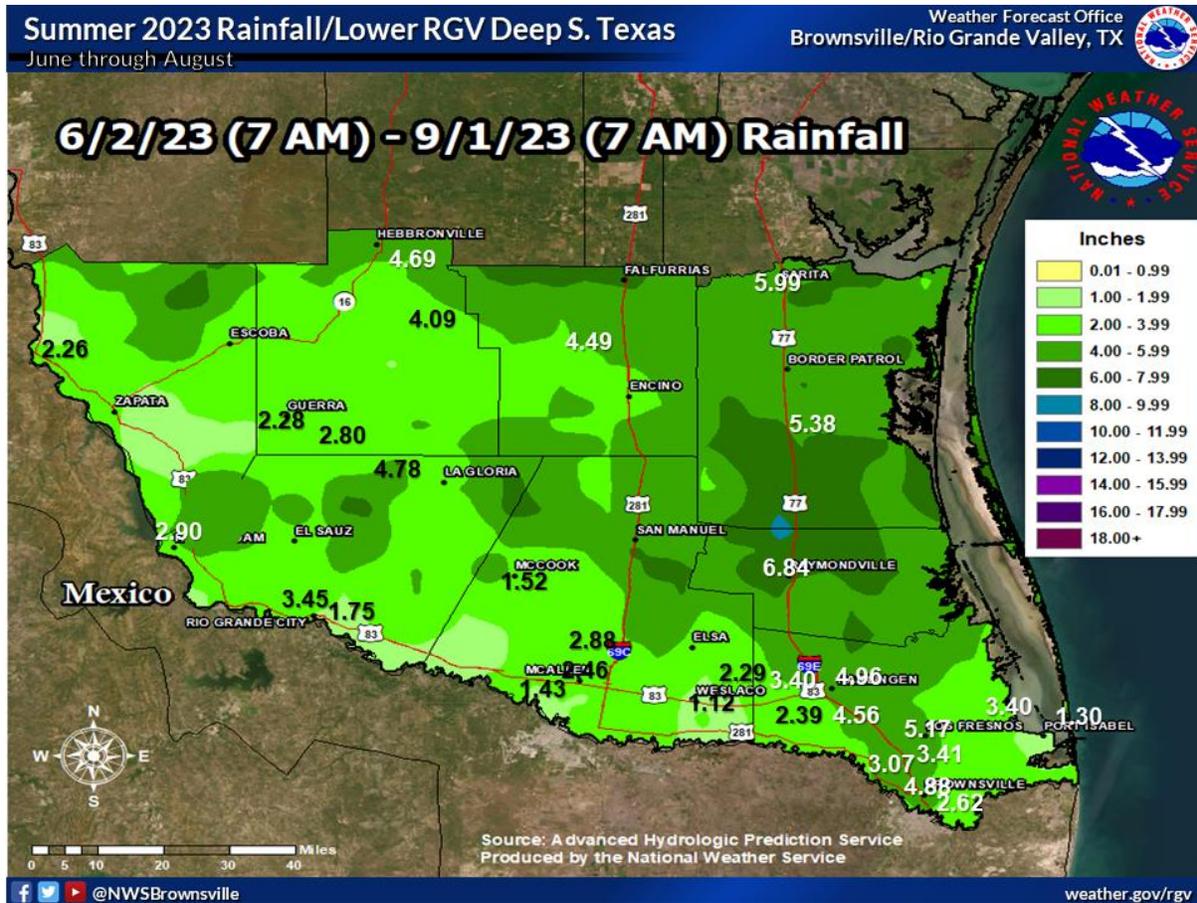


Figure 3 Annotated rainfall map for summer 2023 across the Lower Rio Grande Valley/Deep South Texas region.



September 09, 2023 90-Day Percent Precipitation

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

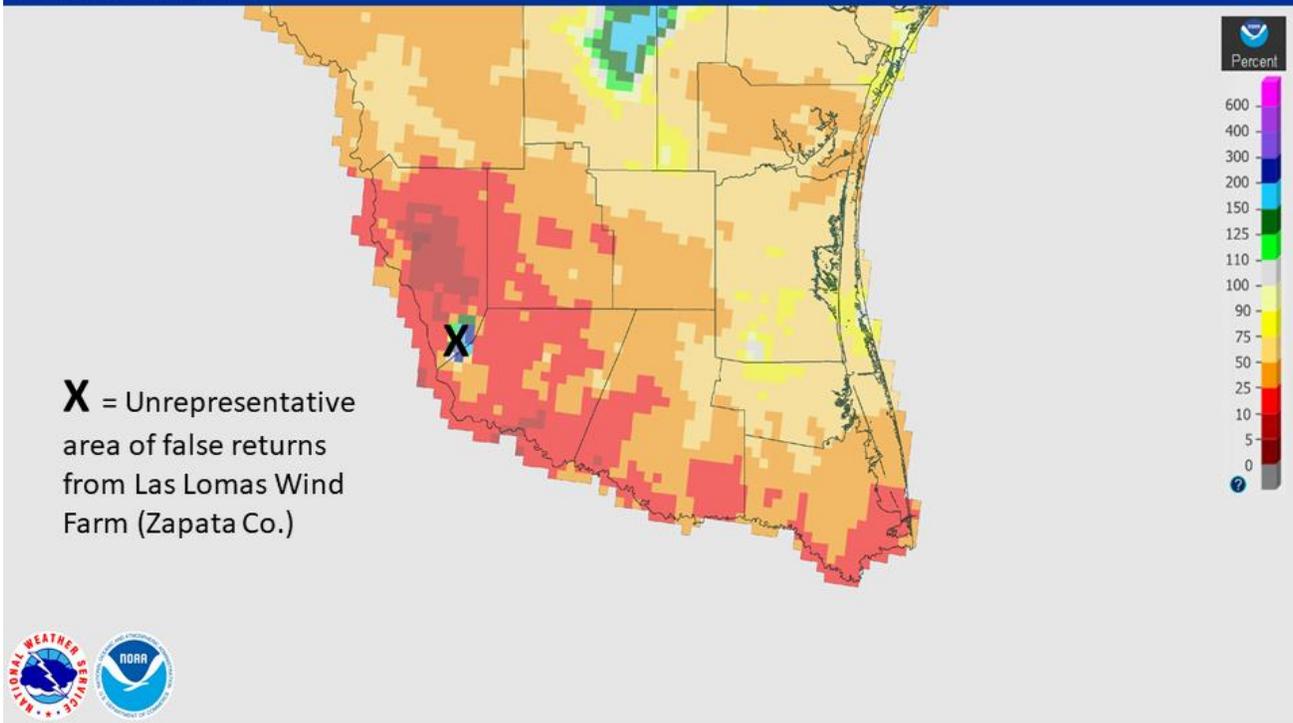
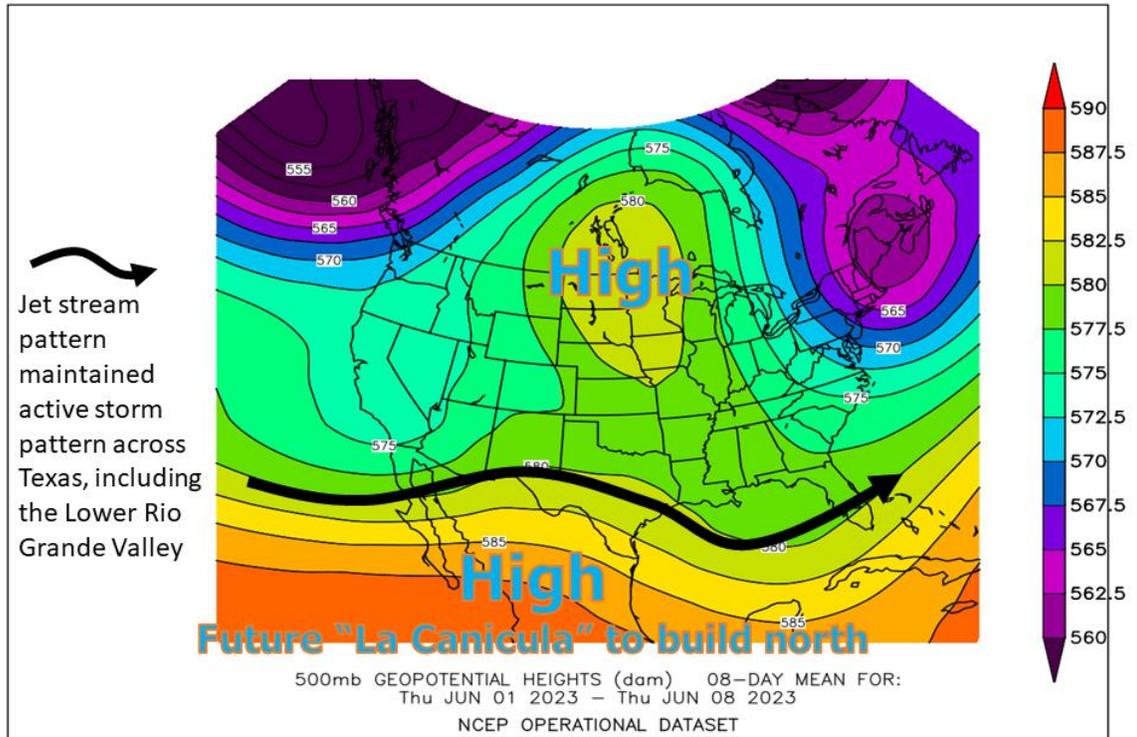


Figure 4. Rainfall departure from average, June 11 through September 9, 2023. From Zapata County through the populated Interstate 2/IH 69E corridor, rainfall was less than 25 percent of average.

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.



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

weather.gov/rgv

Figure 5. 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.

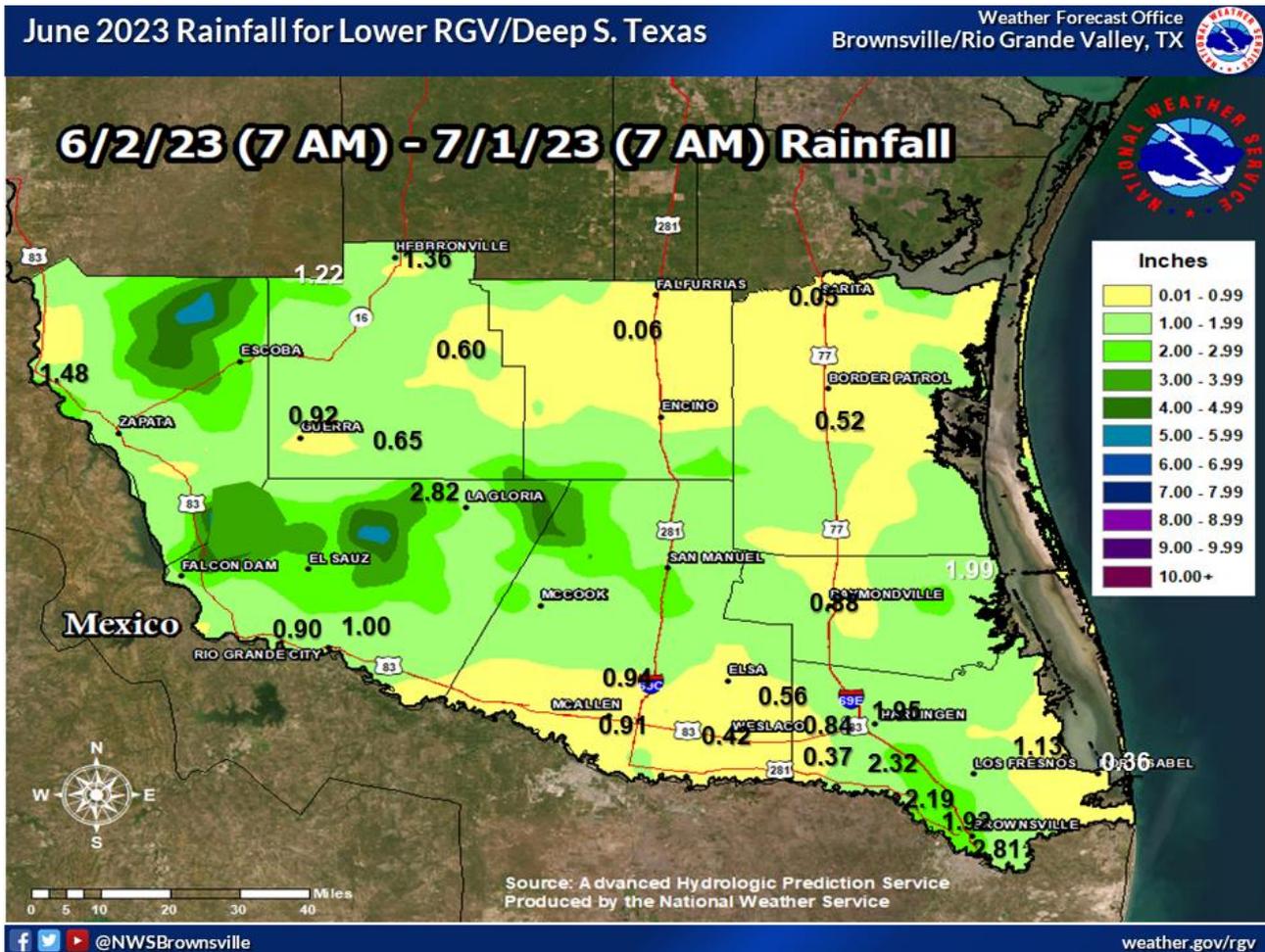


Figure 6. June 2023 rainfall for the Lower Rio Grande Valley/Deep S. Texas region. Nearly all of the rain fell between June 3 and June 8, before the “heat dome” took control

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.

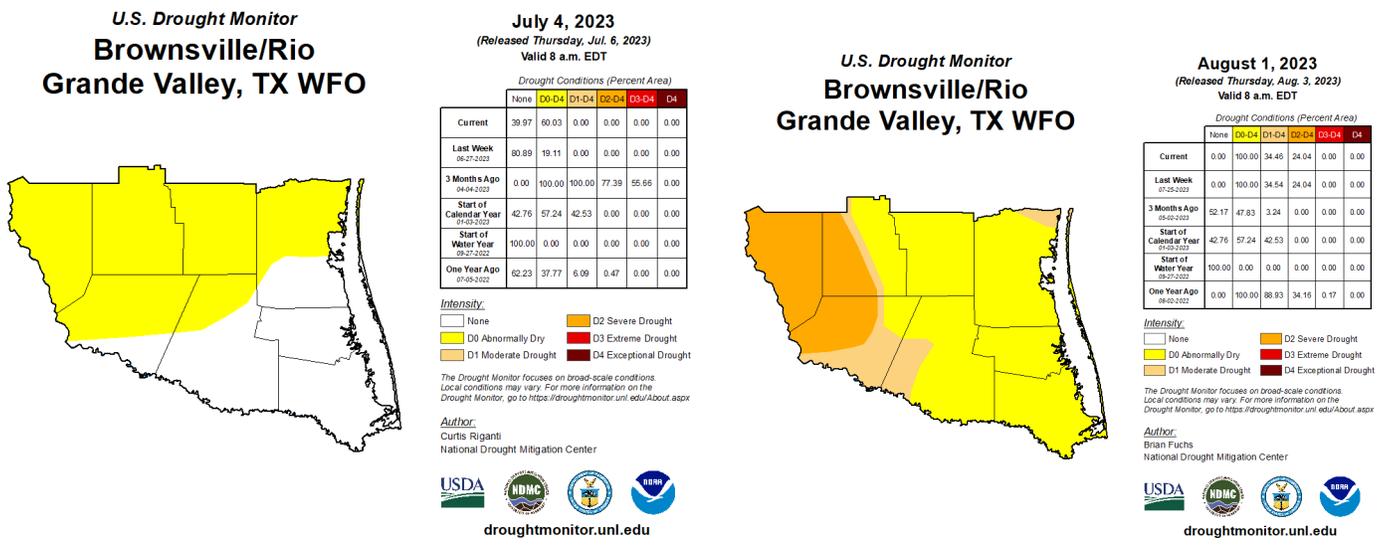


Figure 7. Dryness/Drought Comparison between July 4 and August 1, 2023. Severe (Level 2) and Moderate (Level 1) Drought developed rapidly in July as pastures, brush, and livestock and various detention ponds dried up considerably. While the long-term drought indicators were at the low end of the scale, 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](#).

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)

 @NWSBrownsville

weather.gov/rgv

Figure 9: 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.

Summer (June-August) 100 Degree Days in RGV Cities

Weather Forecast Office
Brownsville/Rio Grande Valley, TX



Totals at the Top of the List

Number of Days Max Temperature ≥ 100 - Jun through Aug - Brownsville Area, TX (ThreadEX)

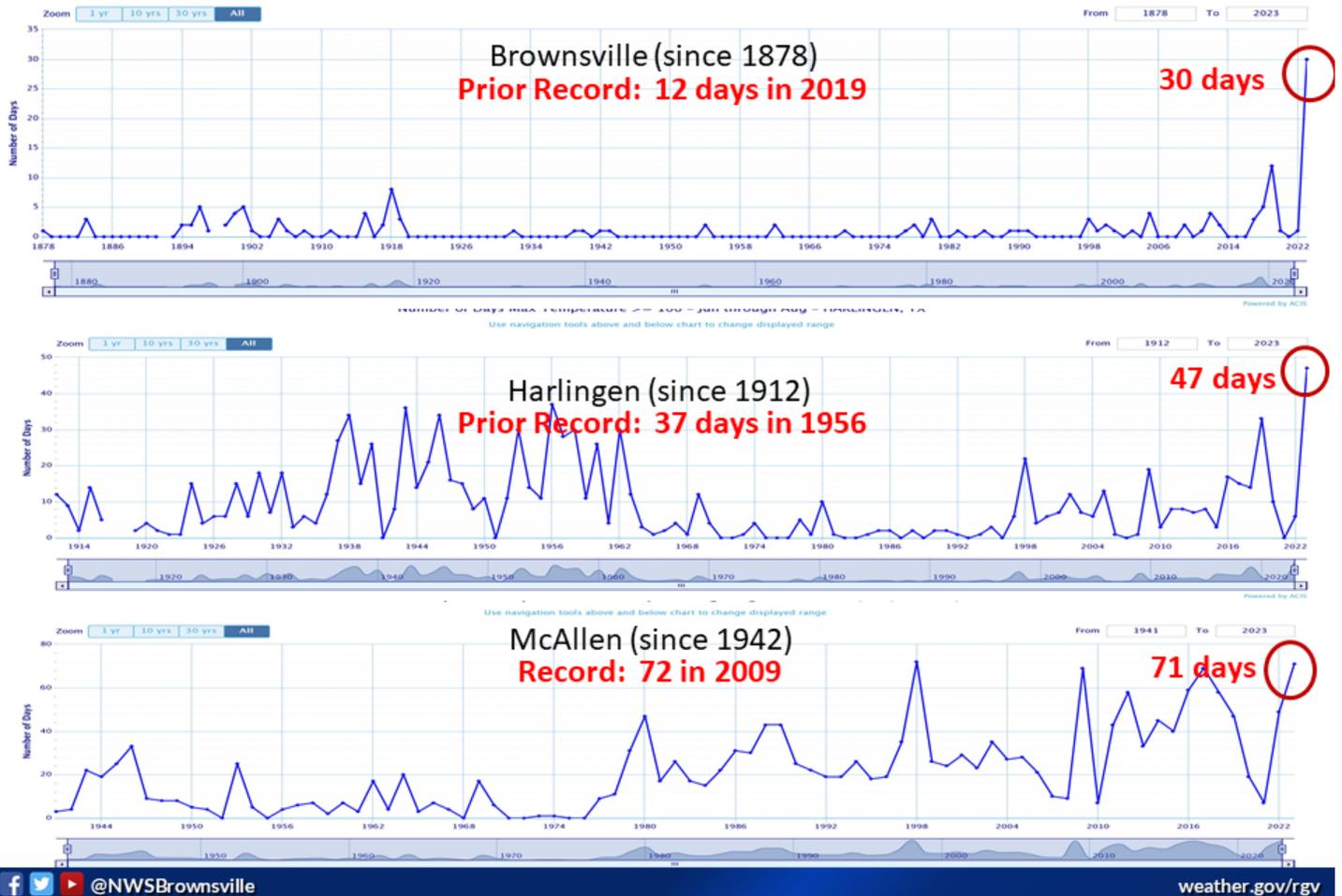


Figure 10: Numbers of 100-degree days for Brownsville, Harlingen, and McAllen in summer 2023 (June-August). Brownsville and Harlingen soared above prior records, while McAllen just missed on their prior record of 72 in the searing summer of 2009.

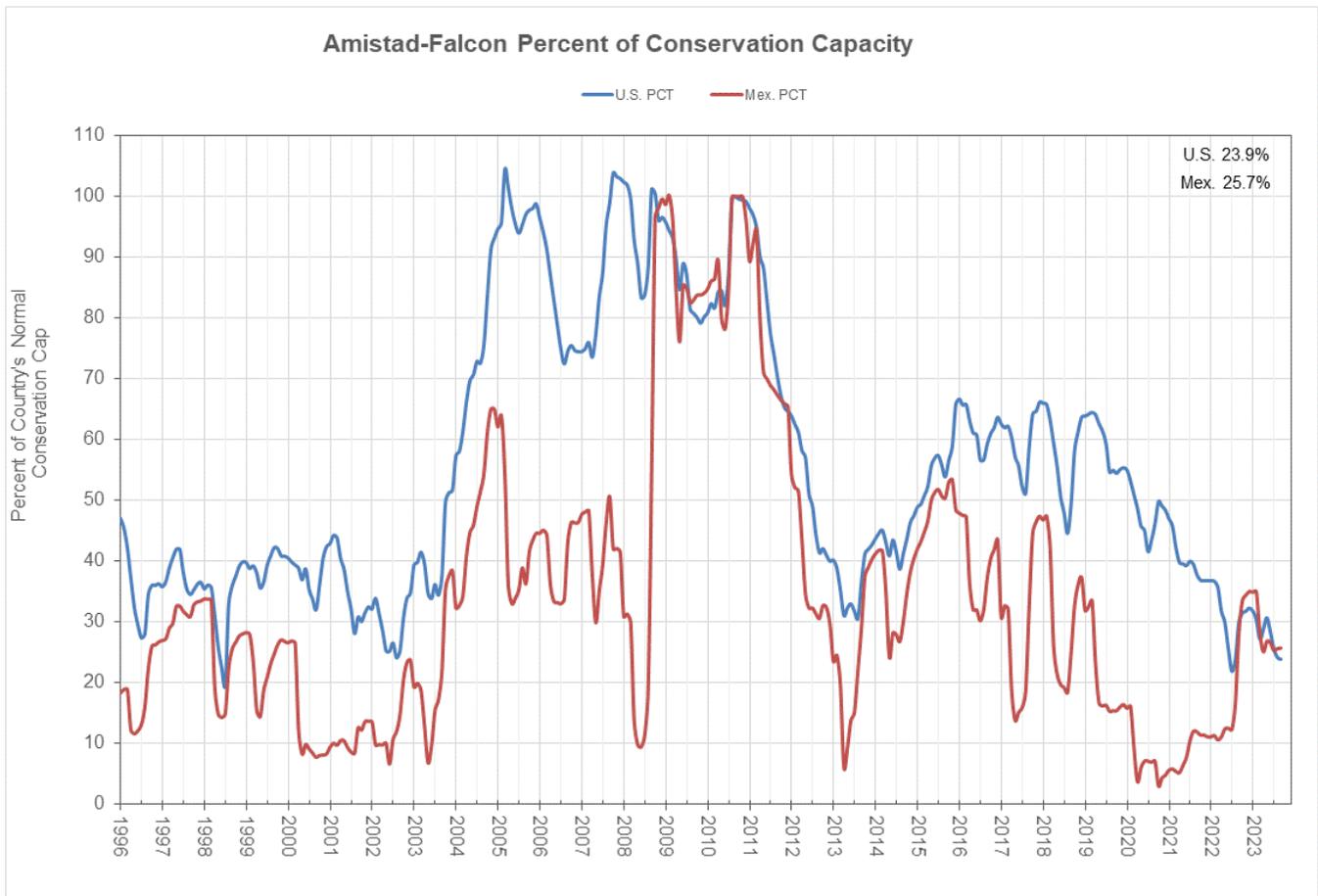


Figure 11: Percent of Conservation (ownership) Capacity for the US and Mexico, Amistad minus Falcon International Reservoirs. For the second summer in a row, the US percentage fell below 25 percent, triggering Stage 2 water conservation rules in several Valley communities. These are among the lowest values in the past 25 years. Data courtesy of the International Boundary and Water Commission.