

Rio Grande Valley Spring 2024 Review

**Spring 2024 Weather Story for the Rio Grande Valley:
Record to Near Record Heat Dries Up Infrequent Rains
Heat Builds in April and May; Water Supply Crisis Ensues**

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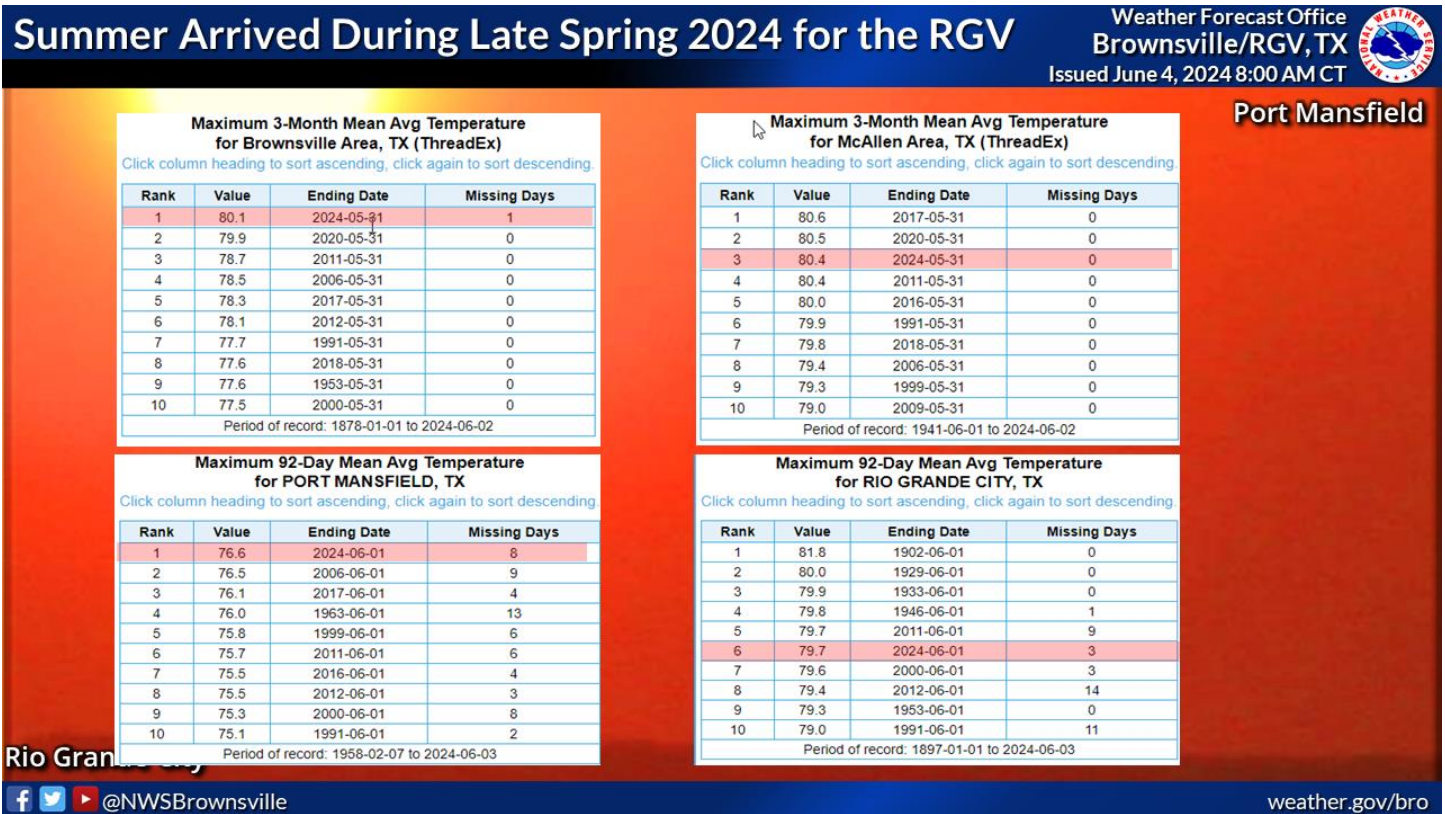


Figure 1: Record to near-record warmth was the story for spring 2024 across the Lower Rio Grande Valley. April, and especially May, tilted the scales toward new records.



3/2/24 (7 AM) - 6/1/24 (7 AM) Rainfall

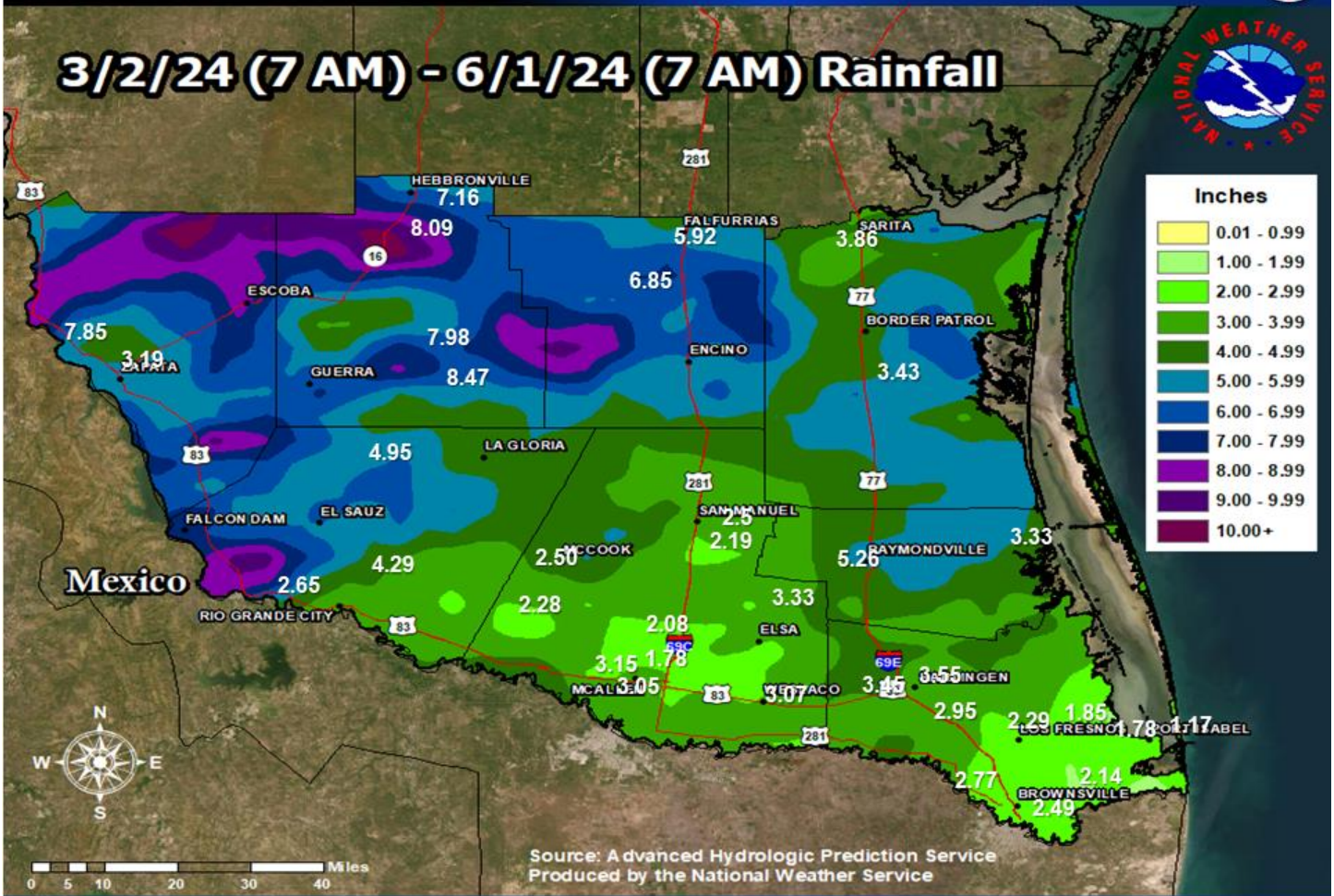


Figure 2. Annotated rainfall map for spring 2024 across the Lower Rio Grande Valley/Deep South Texas region. Annotated values are a combination of CoCoRaHS, ASOS (NWS), AWOS (FAA), and the Texas Mesonet.

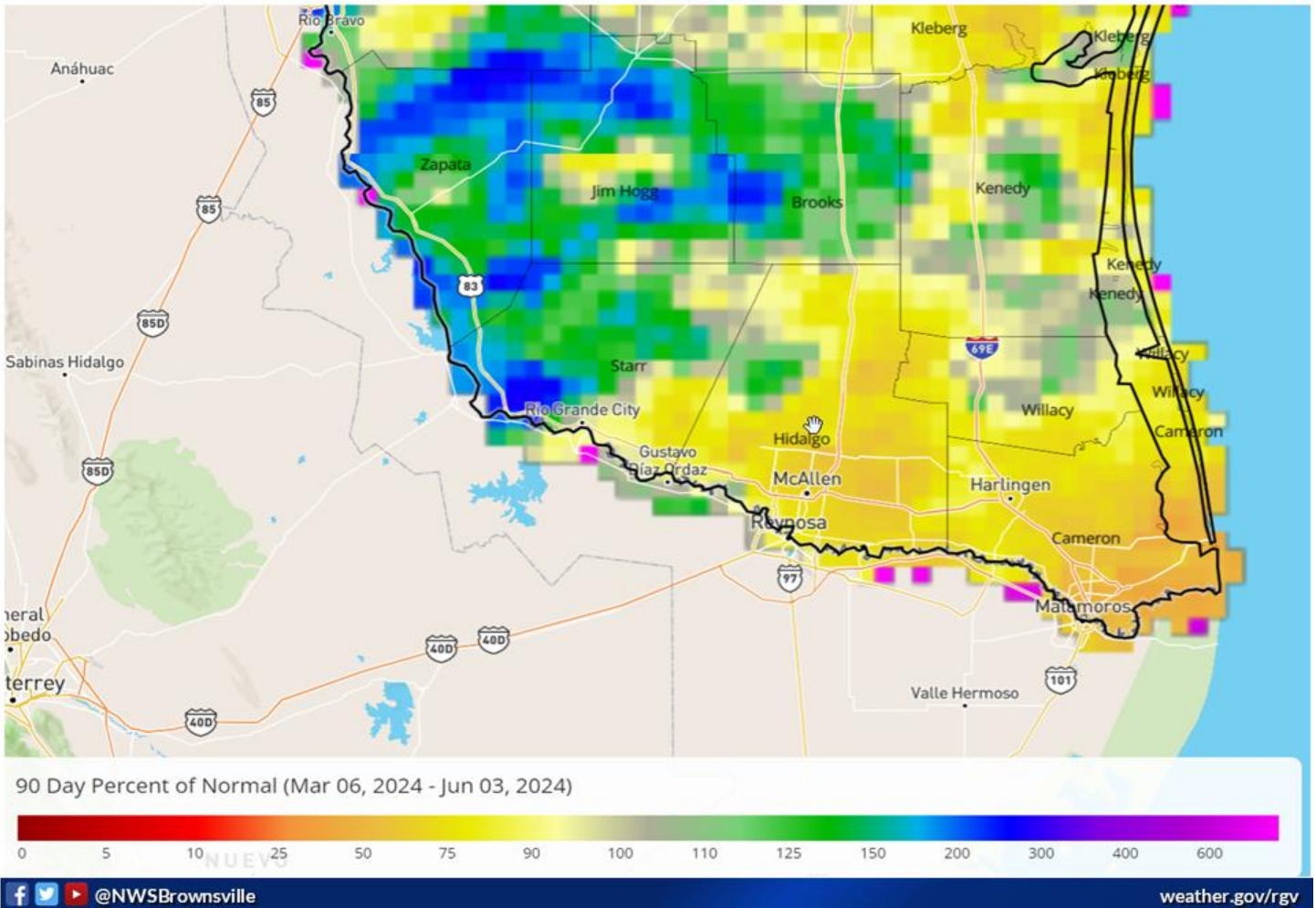


Figure 3. Rainfall percentage of average, March 6 through June 3, 2023. Heavier rainfall favored the Brush Country, upper Valley, and Rio Grande Plains, but persistent heat countered the rainfall with rapid evaporation in these areas.

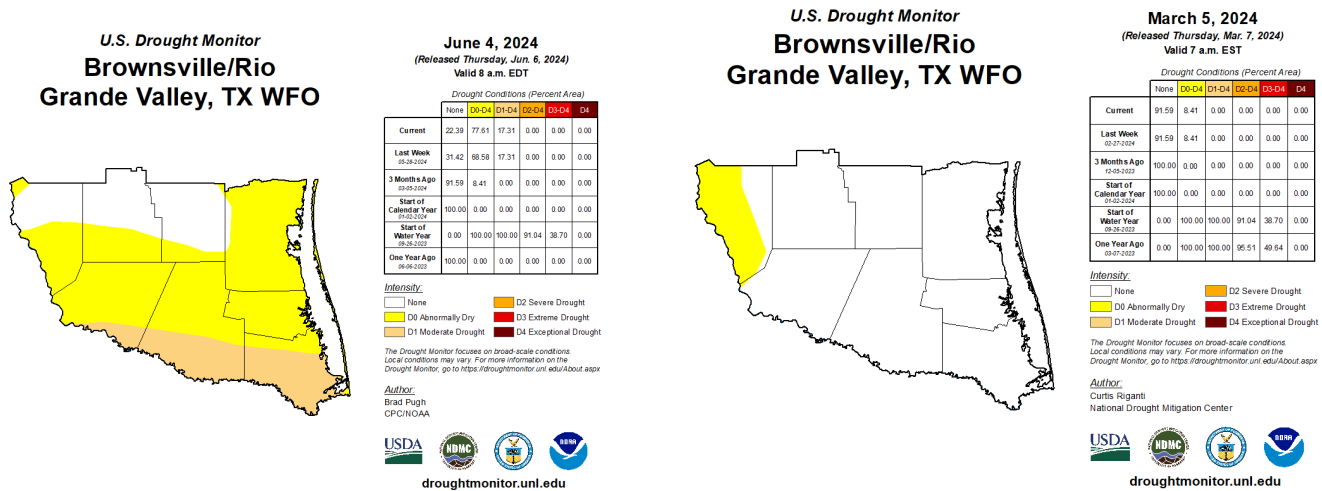


Figure 4. U.S. Drought Monitor degradations between March 5th, 2024 (right) and June 4th, 2024 (left). Despite periodic rainfall across Starr, Jim Hogg, and Zapata County, near-record heat countered the soil's ability to retain the moisture and kept dryness and moderate drought at times.

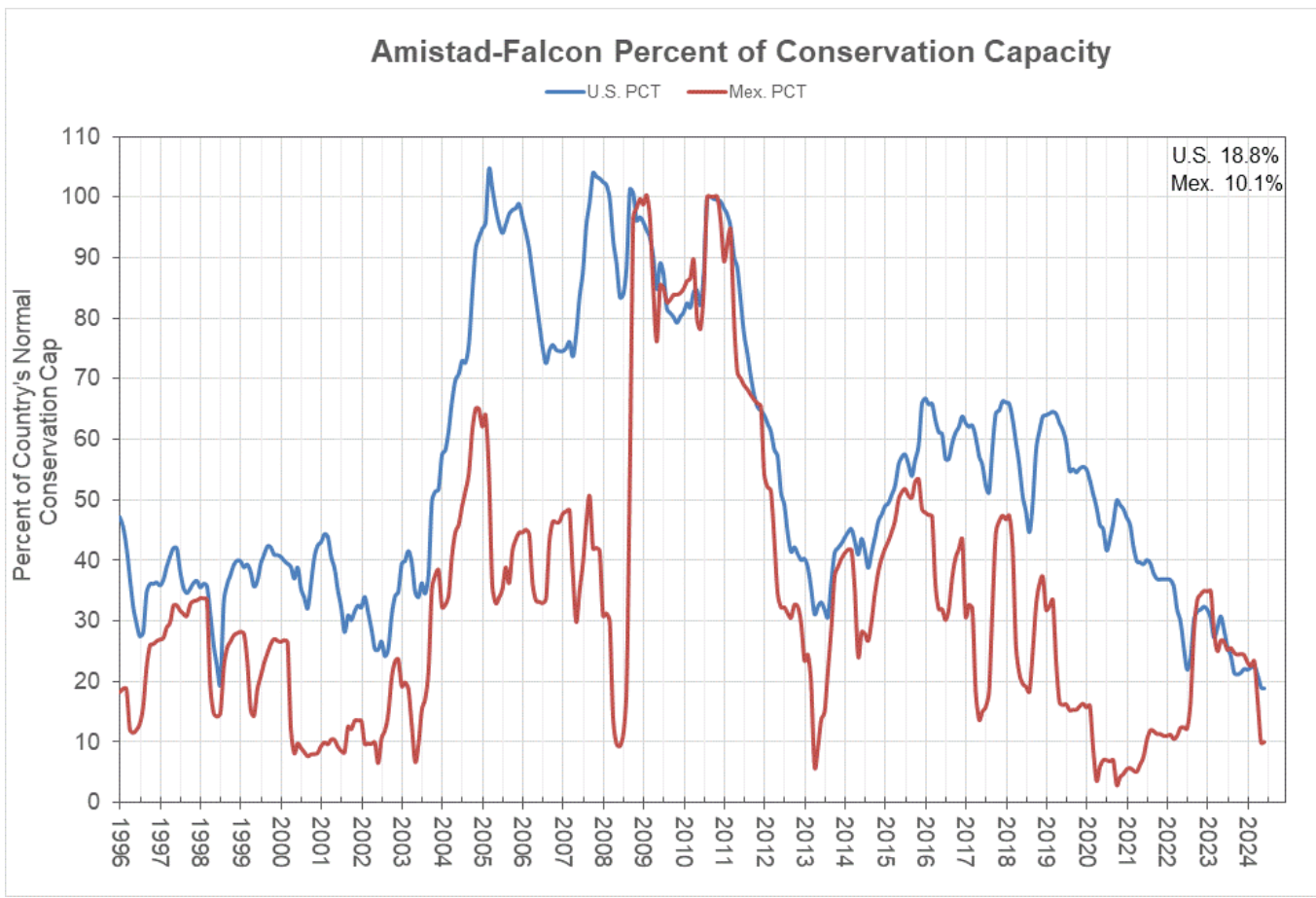


Figure 5. U.S. International Boundary and Water Commission (IBWC) combined percentage of conservation capacity for Amistad and Falcon International Reservoirs, as of the start of June 2024. The combined low values were the lowest on record since each dam was constituted (Falcon in 1954; Amistad in 1971).

Month-by-Month Summary

March featured periods of warm to very warm weather interspersed with periods of slightly cooler than average conditions, with the end result an above average month (temperatures generally 1 to 2.5 degrees above the 1991-2020 30-year benchmarks). This continued a trend that began in February, as the average temperature ended up within the top twenty all-time warmest for locations in Hidalgo, Cameron, and Willacy County (lower/mid Valley). The first of just three notable spring rain/thunderstorm events for the Rio Grande Valley and Deep South Texas ranch country impacted the Rio Grande Plains to the King Ranch late on March 15th and early on March 16th, as a developing mesoscale convective system (MCS) eased from Zapata through Kenedy County, dropping 3 to more than 6" of rainfall. These would be the highest sub-area rainfall totals for a single event in spring 2024. The populated Rio Grande Valley (Starr through Cameron County) missed out on the heaviest rainfall (Figure 6). The rainfall likely came with large hail that fell over open ranch country, though no reports were logged in near-real time. Ranchers in the area reported the rainfall as "welcome", but rapidly absorbed by mid-morning of March 16th, with no field flooding despite the high amounts and short-fused high rainfall rates.

Monthly rainfall values were 150 to 300 percent of average across the Zapata to Kenedy and Willacy County area, but 10 to 50 percent of average across the more populated Starr through Cameron County region along and near the Rio Grande.

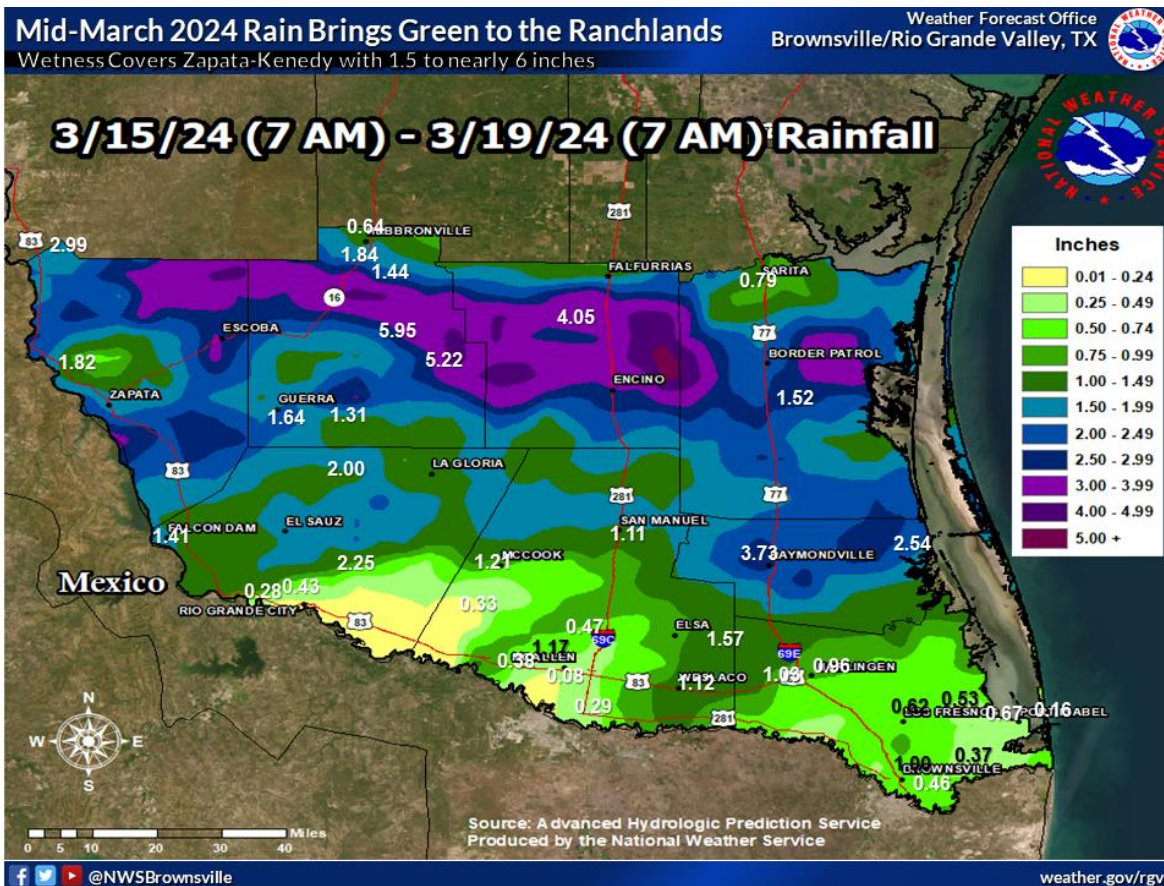


Figure 6. Measured and estimated rainfall for March 15th through early March 19th, 2024. Annotated values are a combination of CoCoRaHS, ASOS (NWS) and AWOS (FAA) four-day totals.

April

April began rather pleasant, with warm days but generally comfortable overnights, with minimal rainfall through mid-month. More notable warming arrived around the 15th and continued through the 21st, before the season's last true cooling front arrived (21st and 22nd) that was also accompanied by the only notable rainfall on those days. The short period of clouds and unseasonable cool temperatures was erased by the 25th through the end of the month, when hot days and sultry nights arrived – a harbinger for May.

Other than periodic light-moderate rainfall that developed along/behind the late month front, rain was scarce in all areas. That rain was “heaviest” across Jim Hogg County, where estimated/measured rainfall ranged from 0.5 to 2” in the northern portion of the county. Otherwise, monthly rain totals were generally 0.5” or less, equating to 5 to 25 percent of average for the month. The lack of rainfall, combined with gradual accumulation of heat, began to stress dryland (un-irrigated) crops.

The development of a persistent south/southeast low level flow during the last week of the month combined with seasonal agricultural burning in southeast Mexico, as well as ongoing wildfires in Central America, to worsen air quality across the populated Valley. Daily average air quality levels of “Unhealthy for Sensitive Groups (USG)” became commonplace – a harbinger of conditions to follow in May.

May will be remembered as the month that was quite literally “hotter than July”! The persistent southeasterly to southerly flow that opened the month did not abate; as the atmosphere heated up, so did the surface temperatures – to the tune of records shattered by 1 to more the 3 degrees above *prior records* (Figure 7). In fact, Brownsville's 87.4 degrees total average (day/night combined) temperature was equivalent to the **fifth hottest JULY** on record! McAllen, Rio Grande City, and Port Mansfield also ranked among their top-twenty

hottest JULYs...in May. Century-mark temperatures got off to a jackrabbit start in spring 2024, with new or tied records for numbers of such days set in McAllen (11; prior record was 8 in 2028), Harlingen/Valley International Airport (4; prior record was 3 in 2028 and 1952), and Brownsville (3; prior record of 3 in 1919 was tied). Sultry overnights, featuring “feels like” temperatures remaining above 90 for most of the night on most days in May, were record-setting as well: Actual temperatures remaining at or above 80 degrees shattered prior records. Brownsville had 17 such mornings, shattering the prior record of 12 in 2019. Harlingen/Valley International Airport had 7, breaking 2019’s mark of 4; McAllen had 12, breaking the prior record of 8 in 2017 and 2019, Port Mansfield had 14 such days, destroying the prior record of 4 such days (multiple years). Rural Rio Grande City matched its more than 100 year record (1902) of 8 days.

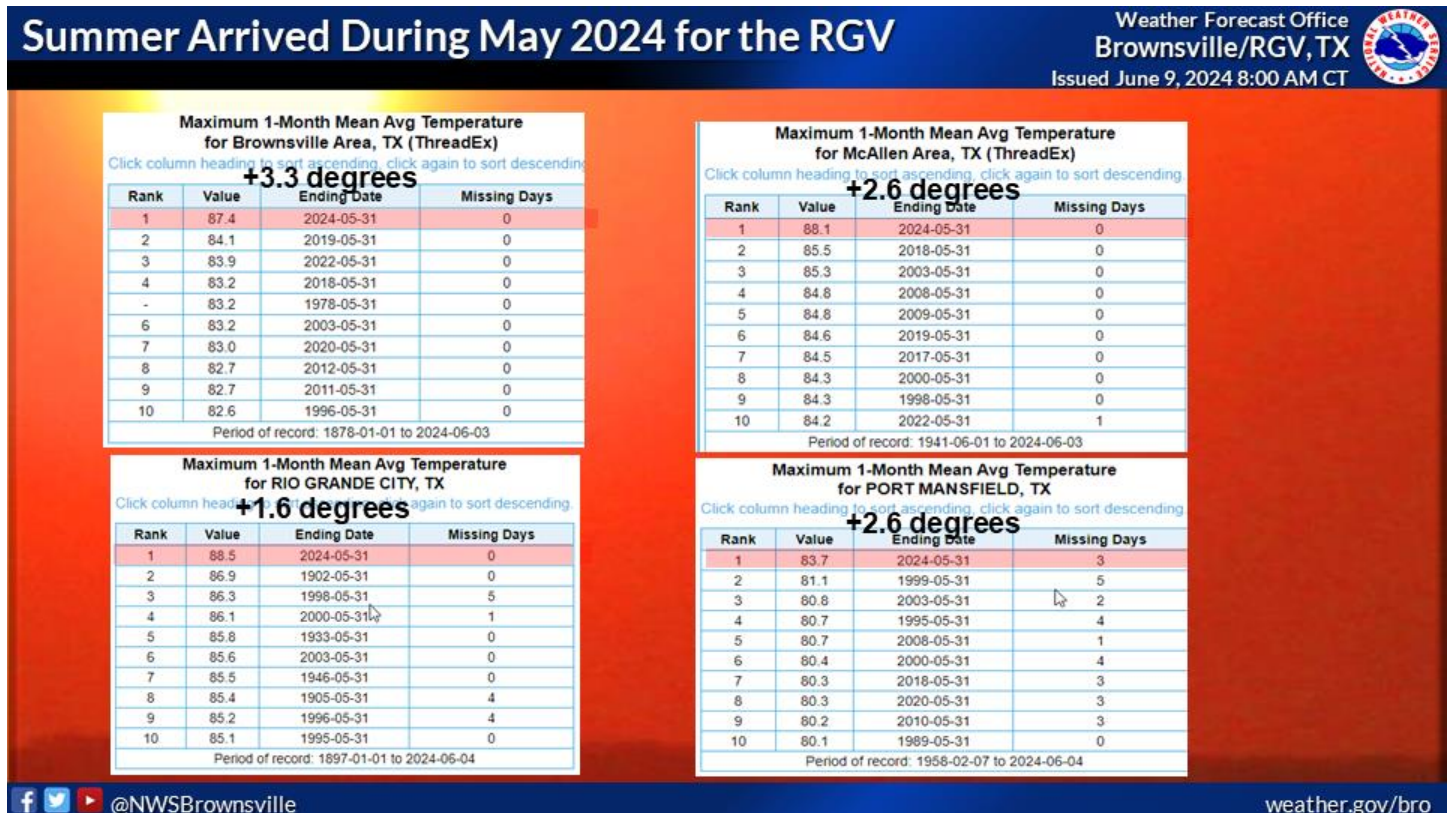
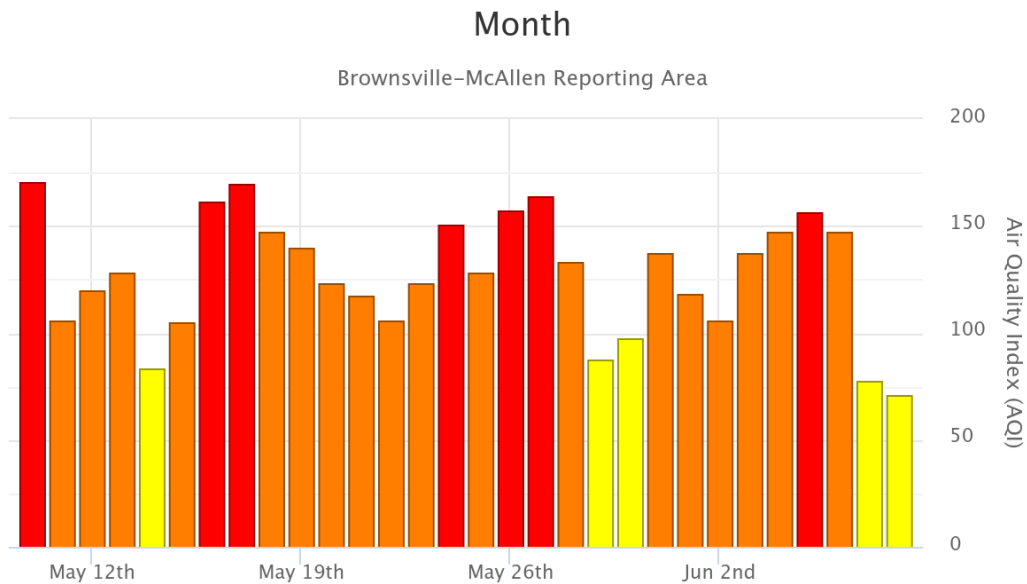


Figure 7: Record-shattering heat was the story of May 2024 across the Lower Rio Grande Valley. Day/night combined temperatures were more in line with the hottest time of year (mid-July to mid-August) than the final month of meteorological spring.

The persistent southeasterly to southerly flow combined with daily subsidence inversion trapped even more fine particulates (known as “PM 2.5”, or particulate matter of 2.5 micrometers) from the peak of spring agricultural burning in southeast Mexico and continued Central American and southern Mexican wildfires. The majority of days in May were either rated as USG or worse, “Unhealthy” (for all groups, Figure 8). Several hours on a few mornings also showed the [Air Quality Index](#) rising above 200 – an unheard-of level outside of nearby wildfires or visible smoke in the area – across the populated Valley. The persistence of USG and Unhealthy air quality in May was unprecedented for the area.



This chart shows the daily AQI in your area for each of the last 30 days. Mouse over or tap a bar to see which pollutant (ozone or PM) was highest that day.

AirNow.gov

Figure 8: Air quality trends from May 10 through June 9, 2024, for the Brownsville/McAllen reporting area.

May also featured several minor, but notable, weather events. Severe thunderstorms developed during the late afternoon of Monday, May 13th east of the Sierra Madre, and pushed quickly across Zapata, Starr, and Hidalgo County, dropping pockets of hail between the sizes of quarters and baseballs along their eastward track through the region. The hailstorms modified into a small mesoscale convective system near the Cameron and Willacy coast, where wind gusts between 46 and 59 mph developed along the outflow boundaries and caused power line/pole damage in southern Cameron County. Three days later, an early morning round of nickel to ping-pong ball sized hail fell in southern Hidalgo County.

Finally, on the evening of May 28th, the heaviest rainfall since mid-March (Figure 9, below) dropped measured and estimated 1.5 to 3.5 inches across the upper Valley and Rio Grande Plains, with lesser amounts across the populated Valley. The rainfall was only temporarily beneficial, as heat and evaporation immediately returned and held dryness/moderate drought in place.

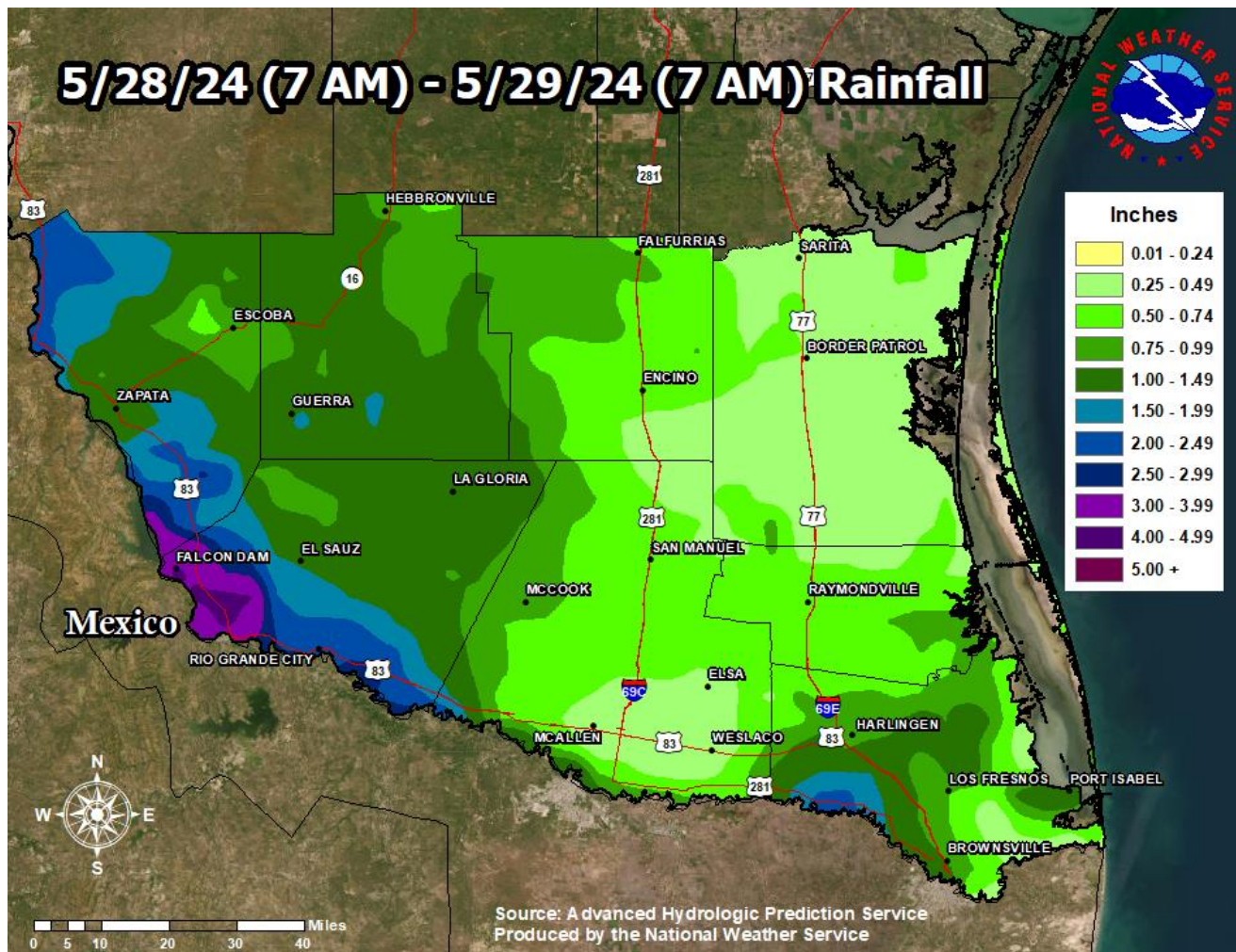


Figure 9. Bias-corrected rainfall for the evening of May 28th, 2024, across the Lower Rio Grande Valley and Deep S. Texas ranch country.

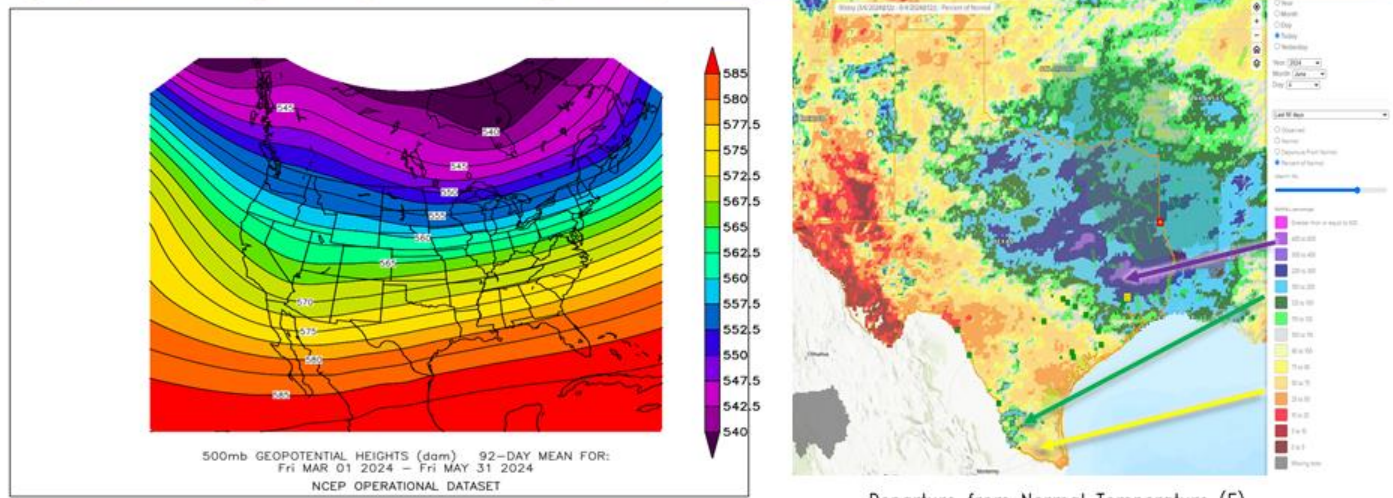
Spring 2024 had quite the variety of weather across Texas – from dry and warm/hot conditions with wildfire threats (and a massive wildfire) in west Texas, to record shattering rainfall in parts of east and southeast Texas. The same upper-level pattern (Figure 10) that fueled both flooding rainfall and killer severe weather and tornadoes upstate also brought the persistent and record-shattering heat of May 2024 to the Lower Valley (Figure 11). Unknown as of this writing were heat-related health impacts for residents of the Valley, considering just how hot May was compared to average – and whether people accustomed to warm to hot springs were able to acclimate to top 10 percent **July** heat so early in the season.

The pattern that allowed the Valley to “wave” to so many of these storm/flood producers was well forecast, as the region had fewer than half the number of widespread and/or significant rainfall and storm events (Eight vs. four). Unfortunately, that same pattern - one that failed to truly tap any deep layered tropical moisture from the southwestern Caribbean and eastern tropical Pacific – brought record low combined reservoir levels along the Rio Grande by month’s end, and water restrictions and states of emergency were commonplace for an increasing number of communities. Impact on agriculture could be severe, with [some studies](#) indicating between nearly \$500 million and \$1 billion in production/loss of crop and livestock.

June 2024 picked up where May left off: Record to near-record heat through the first eight days of the month, and little significant wetting rainfall. The summer outlook does offer a “wildcard” of a very busy Atlantic Hurricane Season – but such welcome rains could come with the host of other dangerous and damaging

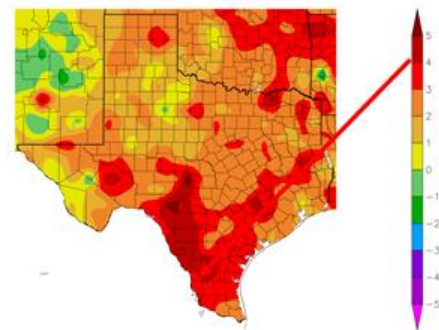
impacts should a direct strike occur in the Lower Valley. Without sufficient late summer rains, a full-blown water crisis would ensue for the region.

Building the Heat, Missing (Most) of the Rain Weather Forecast Office
Brownsville/Rio Grande Valley, TX
Spring 2024 Steering Pattern, Percent of Avg. Rainfall, and Departure from Average Temperature



- West-southwest flow aloft covered Texas, but the better “energy” for rain production remained well north of the LRGV
- There was no persistent “tap” to the tropical Pacific despite a continued moderate El Niño
- Without that “tap”, west and south Texas saw limited rainfall, save for two events in mid March and late May across the Deep S. Texas Rio Grande Plains/Brush Country.

Departure from Normal Temperature (F)
3/1/2024 - 5/31/2024



Generated 6/4/2024 at HPRCC using provisional data.

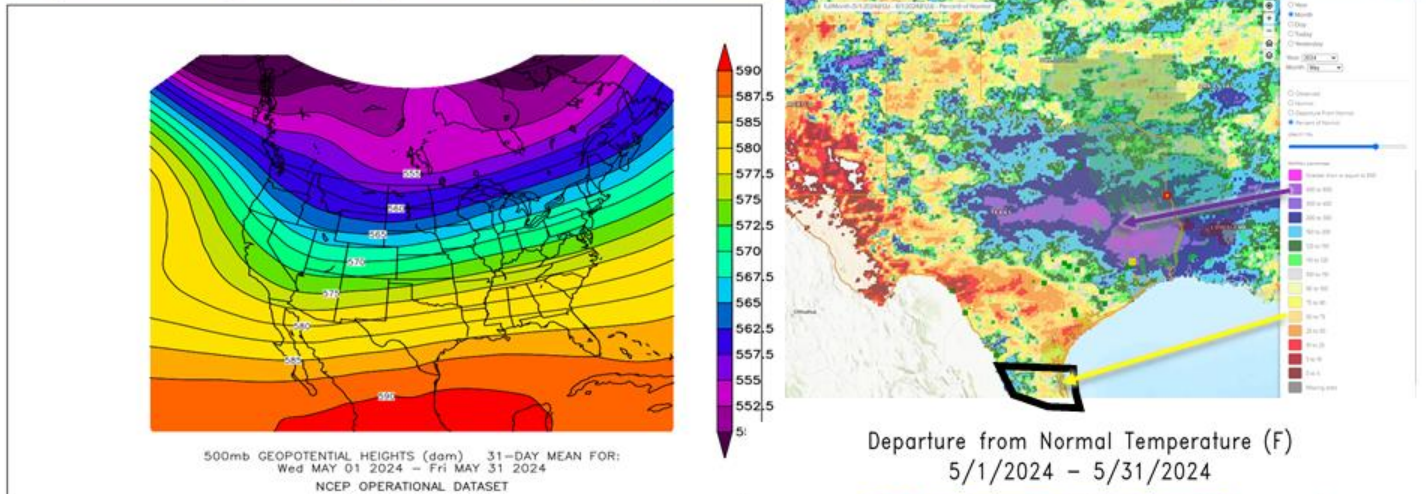
NOAA Regional Climate Centers

Figure 10. The pattern and resultant rainfall and temperature anomalies for spring 2024. While north, east, and southeast Texas benefited from frequent upper level disturbances that utilized the warm to hot and humid air flowing into them, the Lower Rio Grande Valley could only “wave” to the action, as the region was under the northern edge of a seasonally strong upper level high pressure ridge.

Building the Heat, Missing (Most) of the Rain

May 2024 Steering Pattern, Departure from Avg. Temperature, and Percent of Average Rainfall

Weather Forecast Office
Brownsville/Rio Grande Valley, TX



- Northern edge of strong 500 mb ridge axis (above) “nosed” into the LRGV from Mexico in May
- Meanwhile, broader west-southwest flow aloft kept the energy waves coming across central and eastern Texas
- The exceptional heat in the LRGV created drought-like conditions despite a few rain events, while record/near record rains fell just a few hundred miles to the northeast

Generated 6/4/2024 at HPRCC using provisional data.

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Figure 11. The ridge mentioned in Figure 10 was most dominant in May across northern Mexico, nosing into the Lower Valley.