Rio Grande Valley Winter 2023/2024 Review

Winter 2023/2024 Weather Story for the Rio Grande Valley: Quiet Start, Frozen Middle, Wet End

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

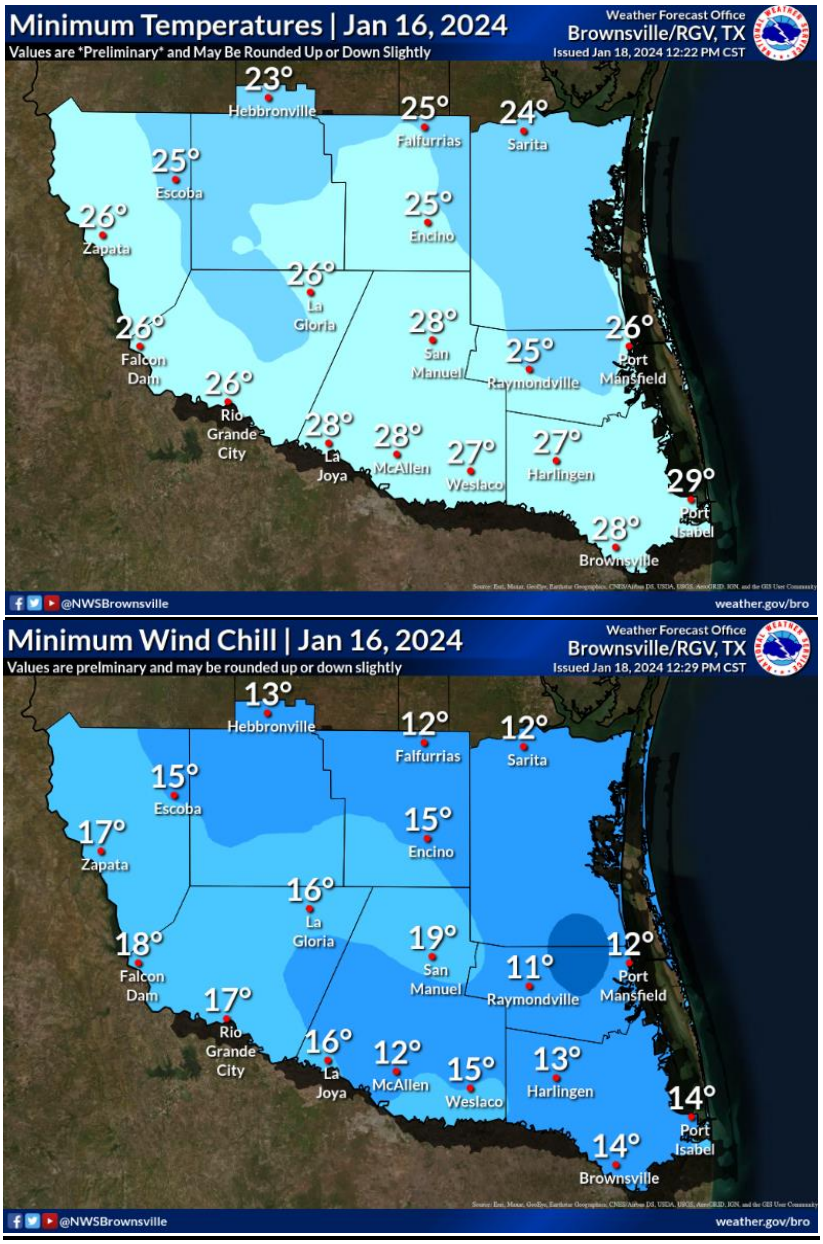


Figure 1. The memorable event from winter 2023/2024 was the coldest temperatures and "feels like" temperatures in mid January, bottoming out on January 16th, with the coldest levels since February 15th, 2021

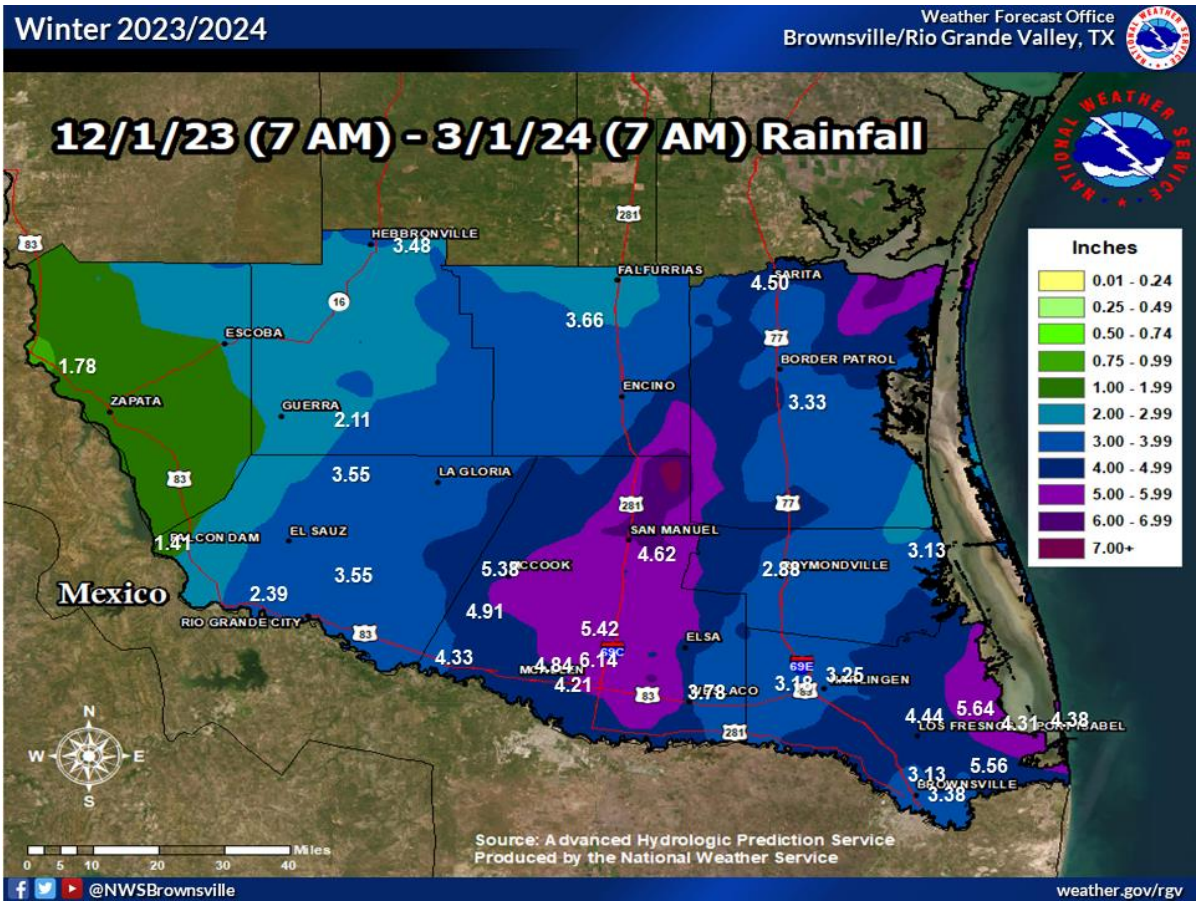


Figure 2. Total rainfall for December 1 2023 through February 29, 2024. The Rio Grande Plains remained on the dry side, while the Brooks/Hidalgo County area were winners, especially with the one heavy rain event of the season in mid-February. Periodic rains near the coast in December and January pushed numbers up in Cameron County.

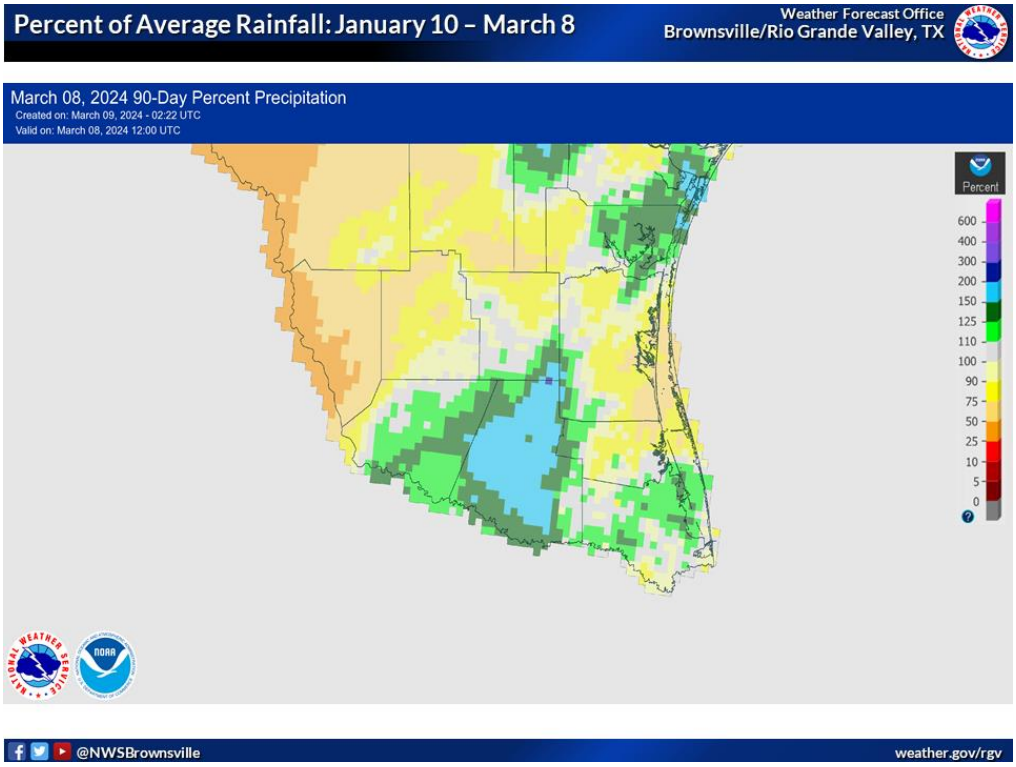


Figure 3: 90-day rainfall from December 10, 2023, through March 8, 2024. The aforementioned heavy rain event in mid February showed up with 150 to 200 percent of average rain across most of Hidalgo County. Lacking a bit were Brooks and Jim Hogg, as well as parts of Willacy and Kenedy. Zapata saw 25 to 50% of average, which returned abnormal dryness there.

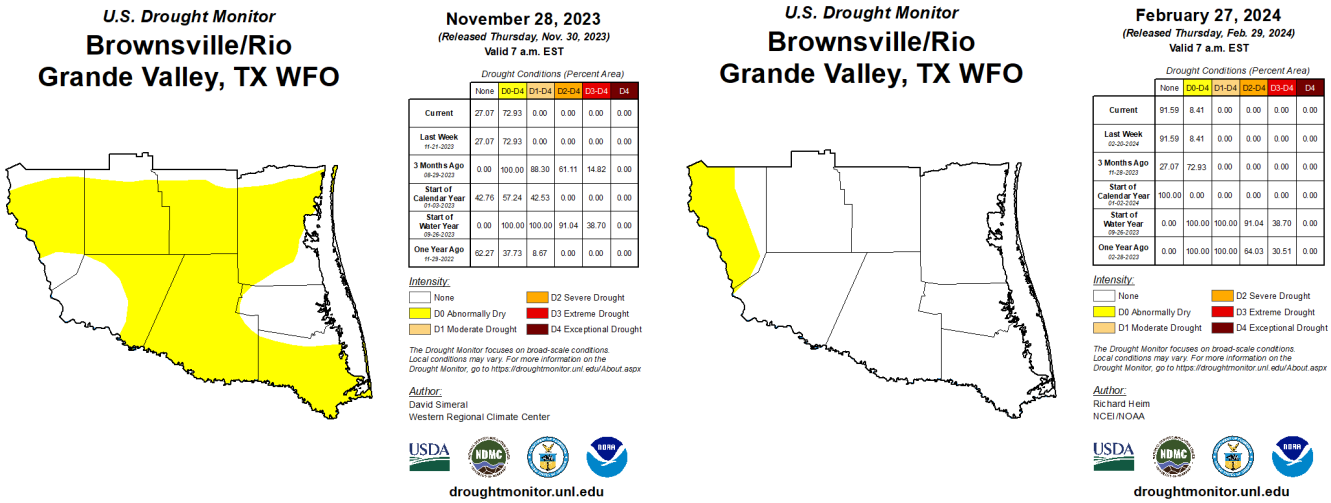


***Figure 4*:** Area-wide abnormal dryness to begin December would be removed soon after, and continue into mid January before dryness returned across the Rio Grande Plains and nudging into western Jim Hogg/Starr County by mid February, before helpful rains pulled back the drought back to Zapata to close the season.

Month-by-Month Summary

December was non-descript across the Lower Rio Grande Valley, with temperatures ending up about 1 to 2.5 degrees above average and rainfall 25 to 75 percent of average for all but a few locations, including the immediate Cameron County coast (a little above average), a section of Brooks County (100 to 150 percent of average), and Zapata County (little to no rainfall). The warm average was set during the first nine days of the month; alternating modest cooling and warming only modified the departure closer to average – but still above. Much of the month was rain-free, but an upper-level disturbance moving through the southwest U.S. combined with broad easterly low level flow to bring generally light rainfall from the 13th through 15th – heaviest along the coast. The same flow pattern pushed ocean water toward or just into the dunes on South Padre Island at high tide late on the 14th and 15th.

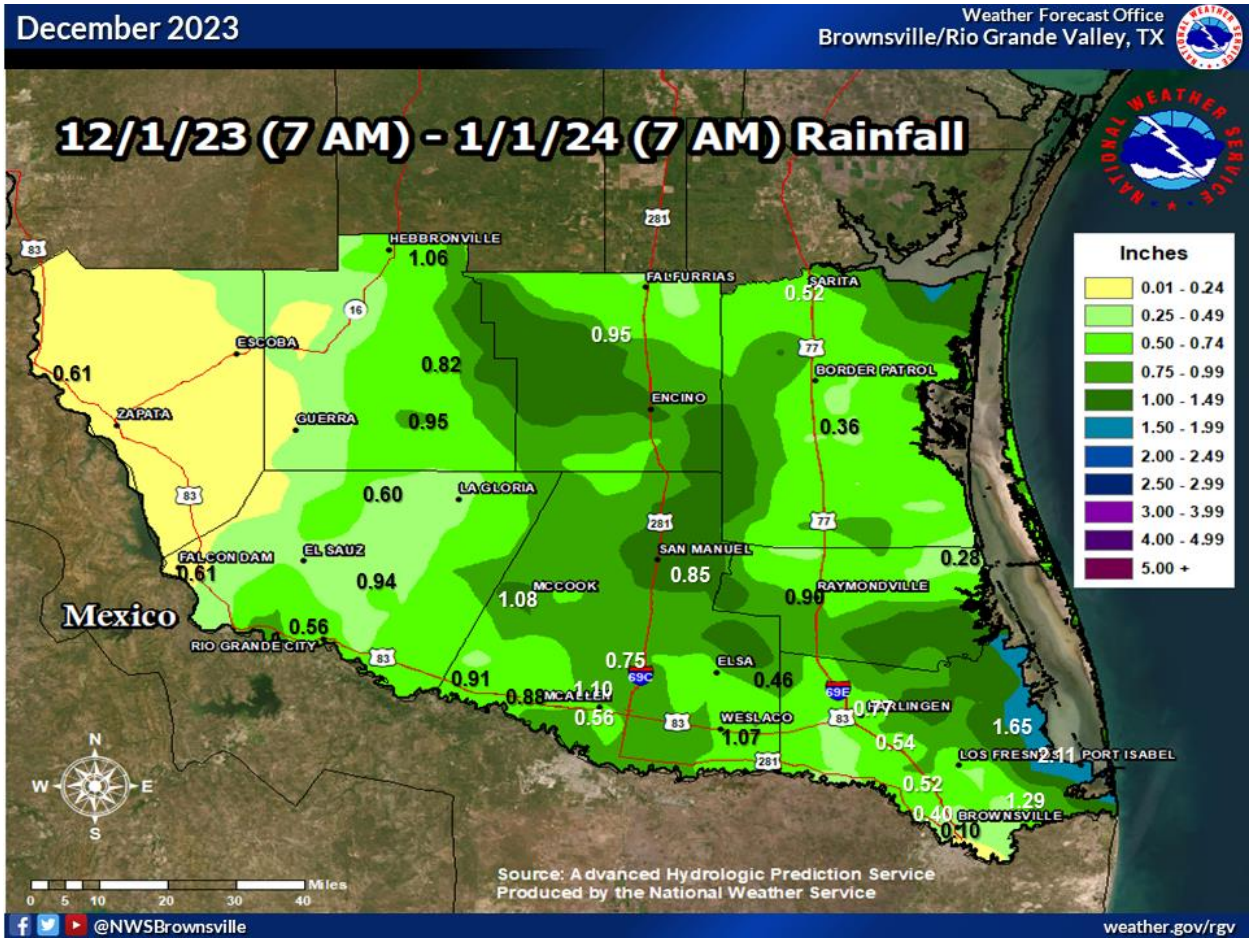


***Figure 5*:** Radar estimated rainfall, with a combination of CoCoRaHS, NWS, and FAA, and Texas Mesonet platform values overlaid, for December 2023 across the Lower Rio Grande Valley and Deep South Texas ranchlands.

The weather script changed in **January 2024.** After a pleasant start to the New Year, a minor banded rain event dropped 0.25" to more than 0.5" in eastern Cameron County early on the 5th. A few days later, a vigorous upper-level disturbance moved into west Texas. A deepening trough of low pressure slid into the Lower Valley, while relative high pressure remained over the western Gulf. The difference between these systems produced screaming gradient southerly winds across Cameron and Willacy County during the late morning through late afternoon of the 8th, with gusts peaking at hurricane force (74 mph) in Brownsville, and 55 mph in Harlingen. Fair and near-average (temperature) conditions followed for the next week, before the second hard freeze in a little more than a year descended on the entire region.

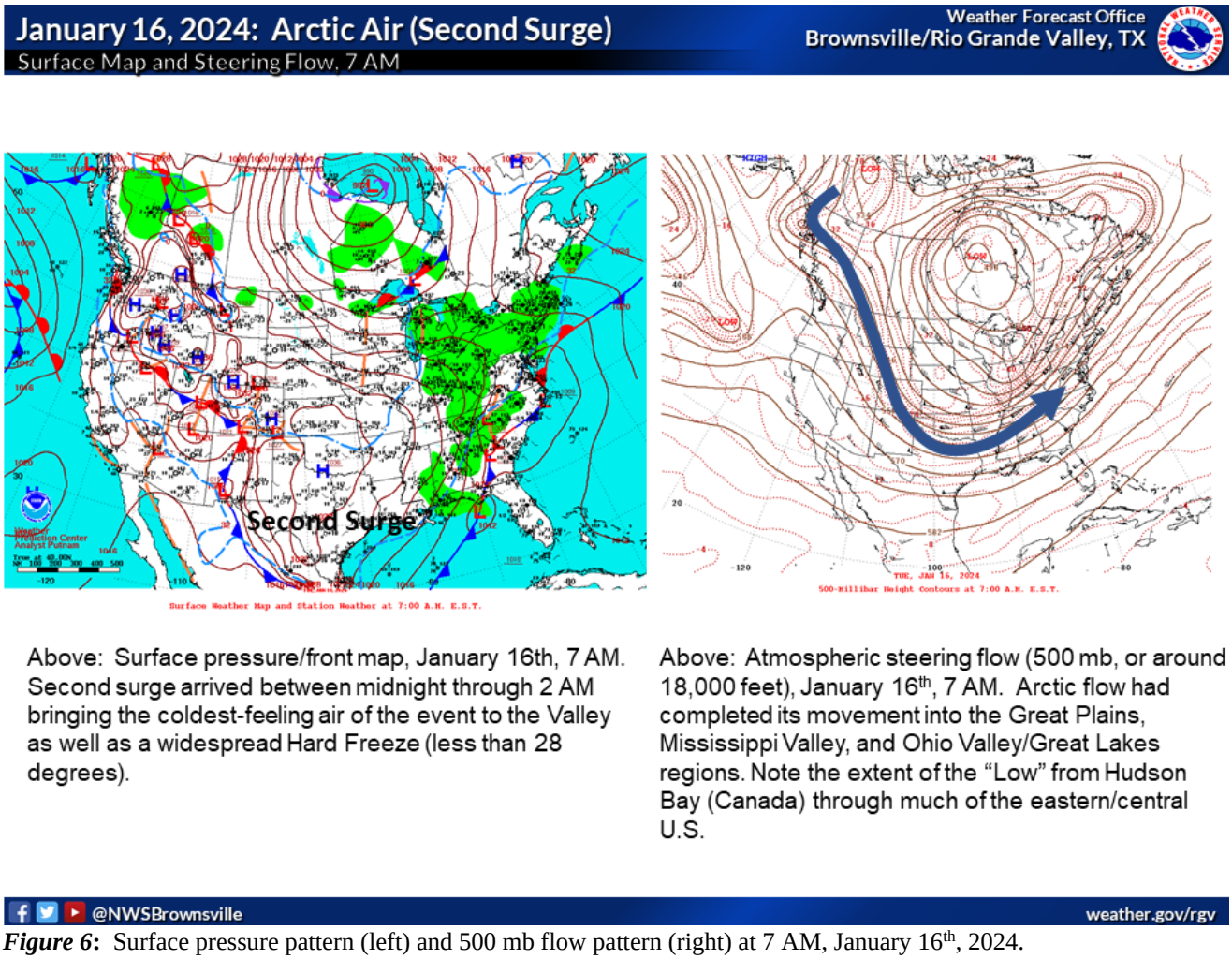
A piece of the circumpolar vortex (which flows around the north pole year-round) broke away and moved southeastward from the Arctic Circle (Canadian Northwest Territories) beginning around the 10th of the month, then continued across the Big Sky country before turning east, with the "breakaway" arctic system covering most of southern Canada and the northern tier of the USA (Figure 6). Two waves of frigid surface high pressure with source air in the Arctic ripped southeastward, and by the morning of the 15th, had reached the Lower Valley. Subfreezing temperatures reached all but the immediate coast that morning, and light freezing precipitation (freezing rain and sleet, assumed) joined the party across some areas.

A hard freeze (below 28 degrees for at least 2 hours) reached Kenedy, Brooks, and Jim Hogg County on the 15th. A second wave of surface high pressure followed during the overnight of the 15th/16th, and a widespread hard freeze occurred in nearly all areas; even South Padre Island fell in to the upper 20s. Clearing skies on the afternoon of the 16th set the stage for a radiational hard freeze from late on the 16th through mid-morning of the 17th, with some locations of the Rio Grande Plains falling into the upper teens. Eastern Cameron County

was spared a third morning of freezing temperatures as cloud cover held values in the mid to upper 30s. Details of this event can be found here.

After a brief warmup, another front returned the chill to the Lower Valley by the 19th, and the month's most prominent region-wide rain followed as southwest flow well above the surface helped to develop weak low pressure along the Lower Texas coast, with the forcing providing the necessary lift for light to moderate rainfall between the 20th and 22nd. Much heavier rain, and even some flooding, occurred along and inland from the middle and upper Texas coast. For far south Texas, these rains pushed monthly totals to or just above average in a few pockets, including northern Kenedy, northeast Hidalgo, northern Brooks/Jim Hogg, and much of Cameron. Unfortunately, other locations in the Brush Country and Rio Grande Plains either missed the action between the 20th and 22nd, or saw little to no additional rainfall at other times during January, leaving their monthly averages at 25 to 75 percent of the 1991-2020 average. Figure 7 shows the total rainfall for January 2024.

The three-morning freeze (January 15-17), followed by the three-day chill (January 19-21), was enough to tip the temperature scales into below average territory – but enough warm periods at other times kept the departure in check, generally ending at 1 to 2 degrees below the 1991-2020 average.



Above: Surface pressure/front map, January 16th, 7 AM. Second surge arrived between midnight through 2 AM bringing the coldest-feeling air of the event to the Valley as well as a widespread Hard Freeze (less than 28 degrees).

Above: Atmospheric steering flow (500 mb, or around 18,000 feet), January 16th, 7 AM. Arctic flow had completed its movement into the Great Plains, Mississippi Valley, and Ohio Valley/Great Lakes regions. Note the extent of the "Low" from Hudson Bay (Canada) through much of the eastern/central U.S.

***Figure 6*:** Surface pressure pattern (left) and 500 mb flow pattern (right) at 7 AM, January 16th, 2024.

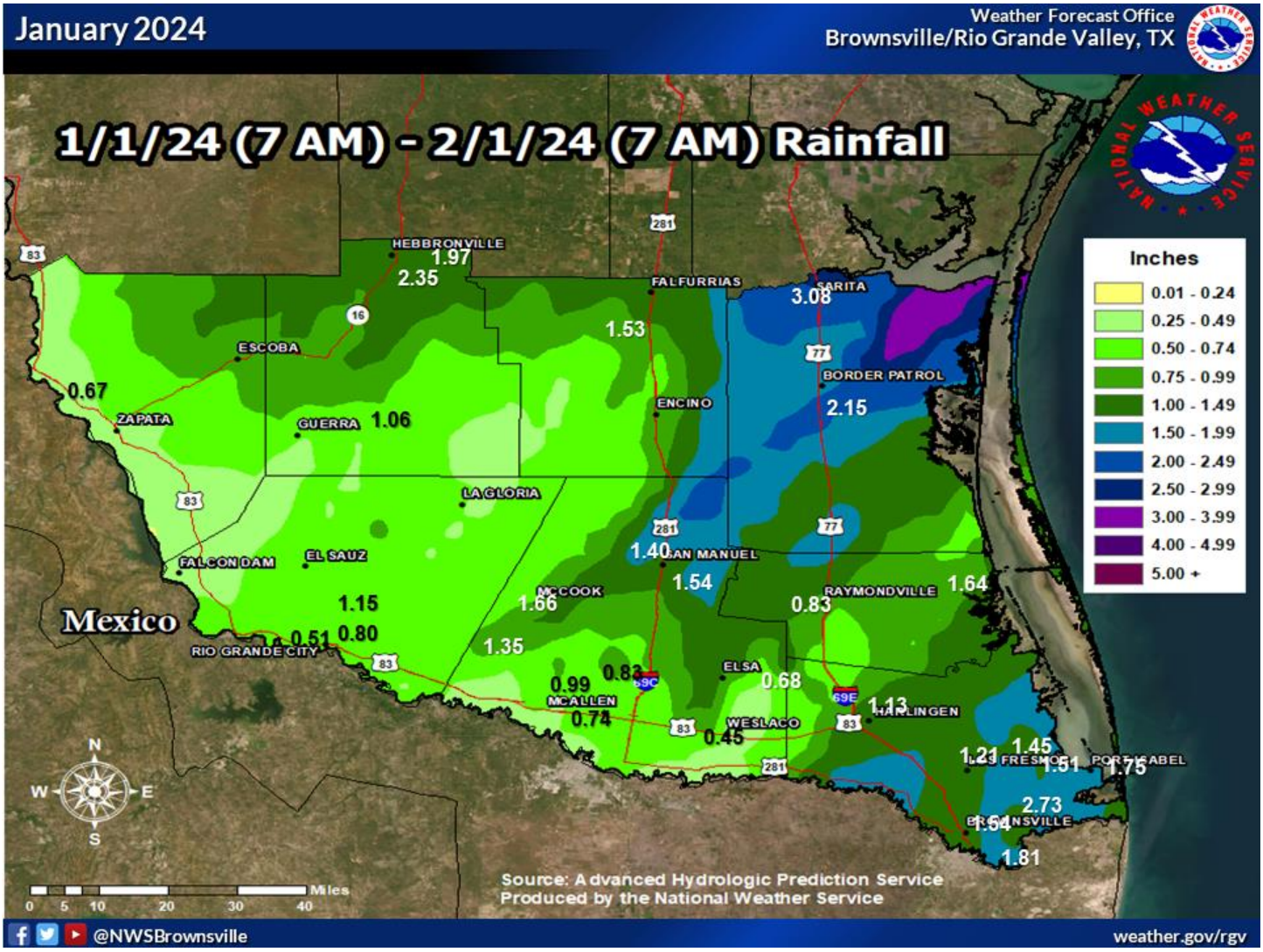


***Figure 7*:** Radar estimated rainfall, with a combination of CoCoRaHS, NWS, and FAA, and Texas Mesonet platform values overlaid, for January 2024 across the Lower Rio Grande Valley and Deep South Texas ranchlands.

February began with a spring temperature burst by day with plenty of dry air to keep overnights/early mornings cool between the 3rd and 7th. One of those warm days came with strong and drying northwest winds (February 4th), which ran over recently "cured" grasses and brush courtesy of the January 15-17 freeze/hard freeze event. On that day, a spark created a rapidly spreading wildfire in Garceño (Starr County), which destroyed one home and threatened others. A spell with warm days and mild/muggy overnights (8th through 11th) was followed by another round of pleasantly mild days/cool nights following a dry front (12th through 14th) before the month's memorable event arrived late on the 15th, continuing through the 17th.

For only the second time since November 10-13, an "El Niño Connection" event set up on the 15th (Figure 8), and dropped between 1" and 4" across most of the four-county Lower Rio Grande Valley area (Figure 9). Observed rainfall for the period was highest in Hidalgo County, where 2 to more than 4 inches fell – up to 400 percent of average, for the entire month! CoCoRaHS observer TX-HDL-21 (McAllen 2.4 miles northeast) led the pack, with 4.17". Between 3 and 4" fell in the McAllen metropolitan area, with 2 to 3" elsewhere across the county. Central/eastern Starr, Willacy, and Cameron fared nicely as well; CoCoRaHS observer TX-CMR-23 (Brownsville 1.9 east-southeast) recorded 2.6". Brownsville/South Padre Island International Airport recorded 1.68" (more than 150 percent of the monthly average), Harlingen/Valley International Airport recorded 1.3", nearly 200 percent of the monthly average.

A couple of chilly nights (30s to around 40) followed the rain (February 18th and 19th) before warm days and comfortably cool nights returned. Humidity joined the warm weather to close out February, bringing somewhat muggy overnights – and percolating the additional moisture into "greenup" of trees, grasses, brush, etc., especially along/east of Interstate 69C from the McAllen metropolitan area to the Brownsville/Harlingen area. The warm start and finish were enough to nudge monthly temperatures to about a degree above the 1991-2020 average.

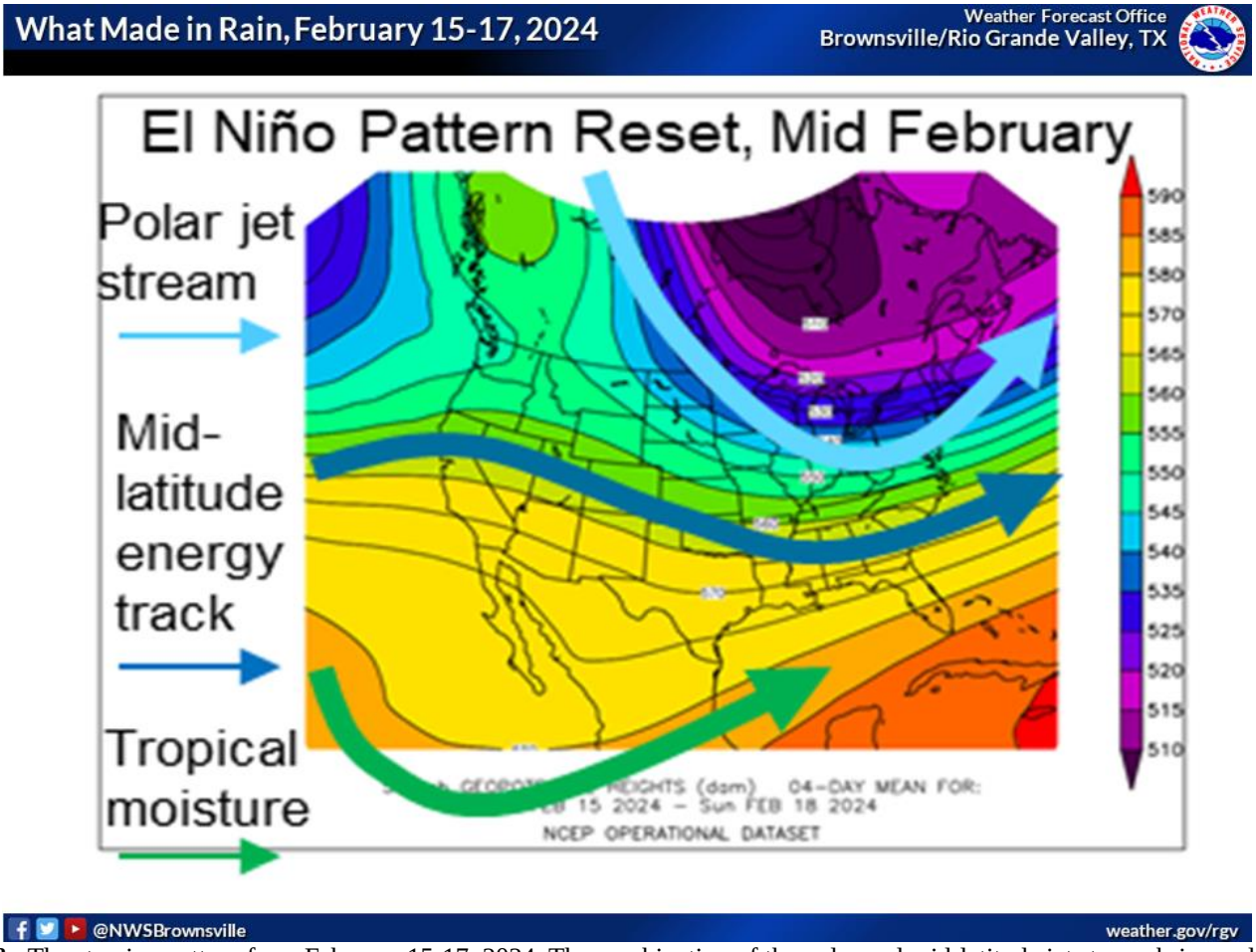


***Figure 8*:** The steering pattern from February 15-17, 2024. The combination of the polar and mid-latitude jet stream bring a slow-moving front southward, while the moisture that arrives from the eastern tropical Pacific Ocean overruns the cooler air. The weak trough across southwest Texas provided the lift, especially during the late afternoon and evening of the 15th, to produce the heavy rainfall observed in Hidalgo County.

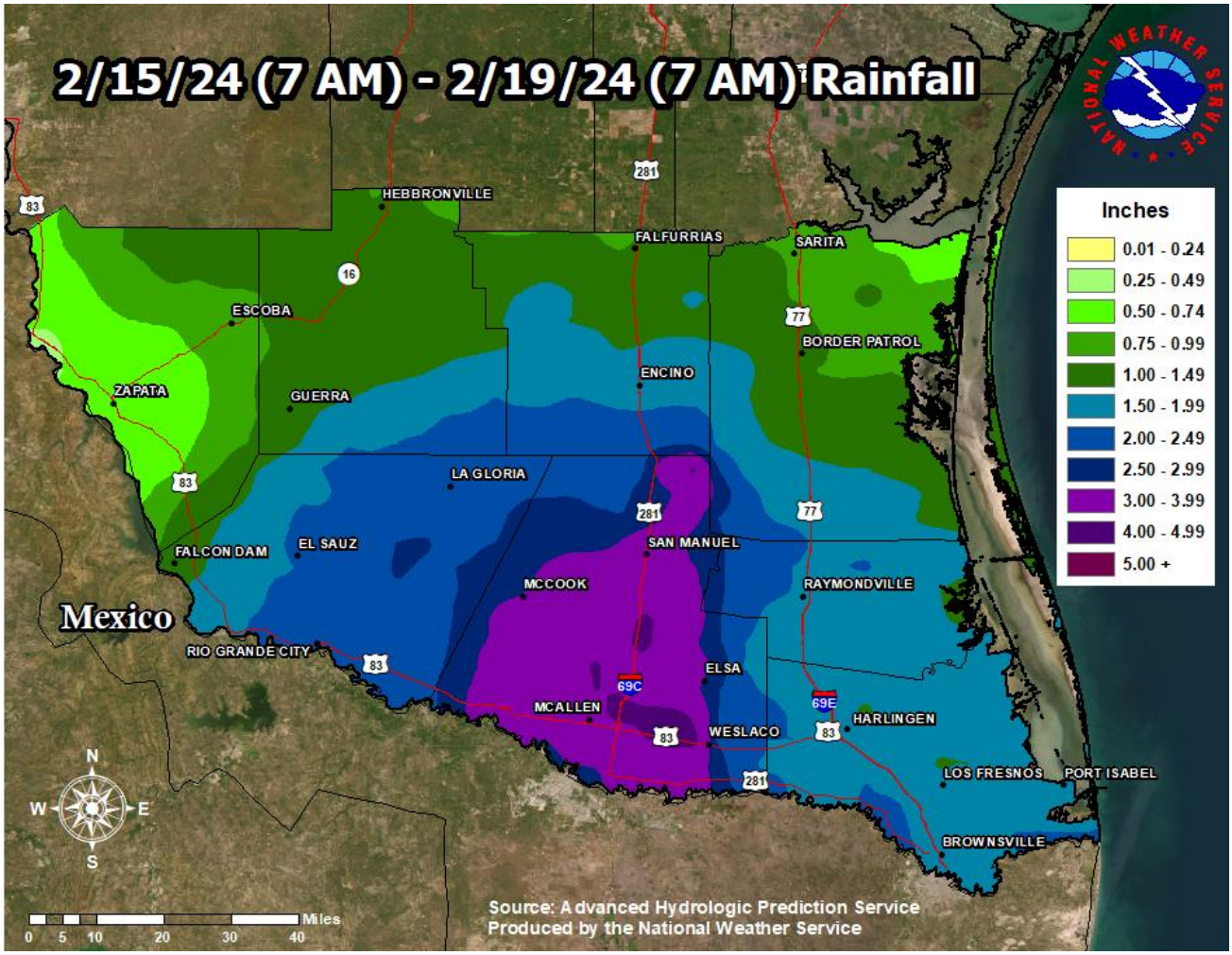


***Figure 9*:** Bias-corrected radar estimates of rainfall during the mid-February 2024 event across the Rio Grande Valley. The Rio Grande Plains, northern Brush Country, and northeastern Kenedy County missed out on the more beneficial rains.

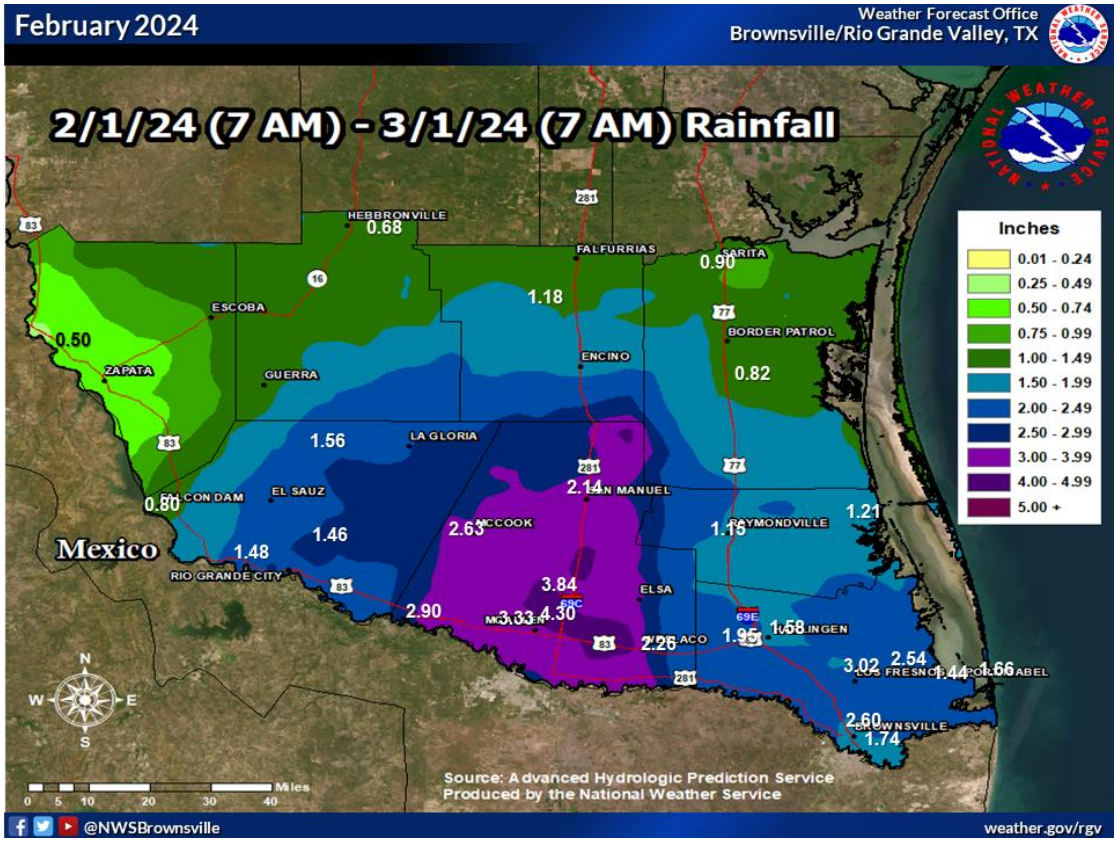


***Figure 10*:** Radar estimated rainfall, with a combination of CoCoRaHS, NWS, and FAA, and Texas Mesonet platform values overlaid, for February 2024 across the Lower Rio Grande Valley and Deep South Texas ranchlands.

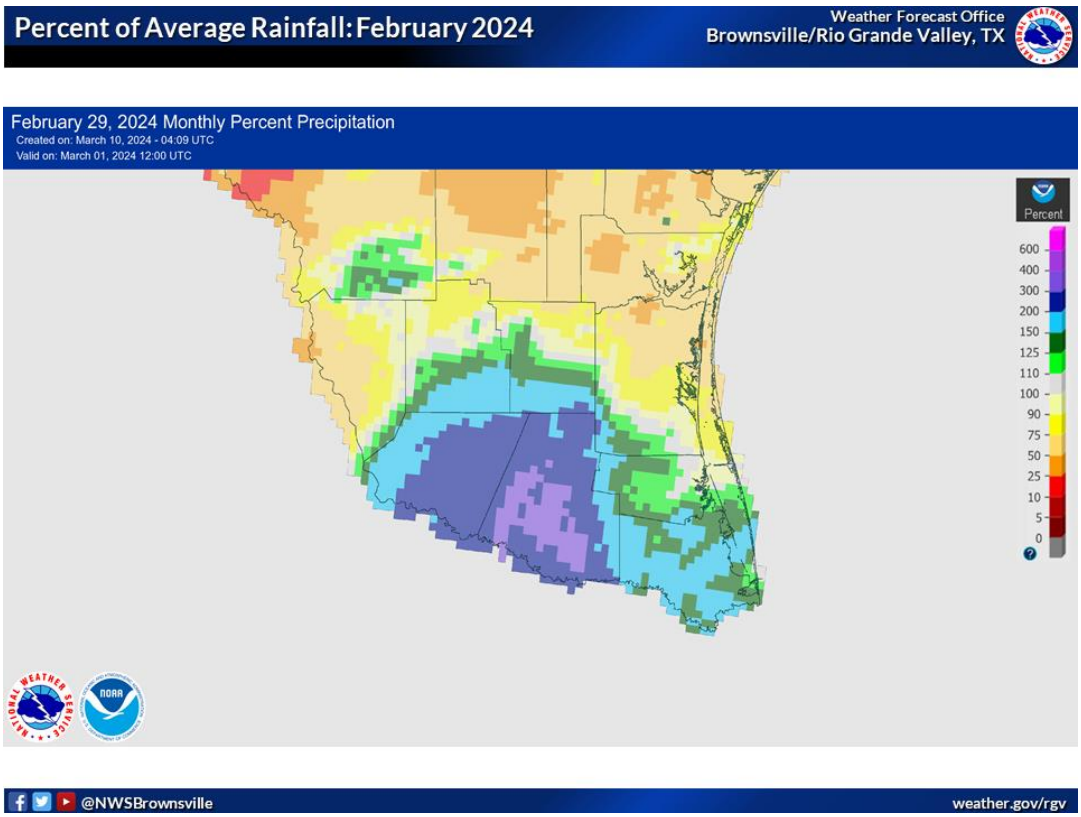


***Figure 11*:** Percent of average rainfall, February 2024. 200 to more than 300 percent of average fell in Hidalgo and eastern Starr, and about 150 percent of average. A sharp drop off was noted farther north and west, with an arc from Zapata through northern Jim Hogg, northern Brooks, and much of Kenedy at 50 to 75 percent of average.

Above: Neighborhood in Brownsville with naturally green grass and leafed-out trees in background after a wet mid-February, followed by warm and humid weather to end February and begin March 2024.

Winter Overall

February's rainfall – in one of the driest months of the year – was enough to bring the sense of winter to "wet" for much of the Lower Rio Grande Valley. Unfortunately, those rains missed the critical inflow regions for both Falcon and Amistad International Reservoirs, which remained at a combined record calendar-period low since their combined "constitution" (construction completion) in the early 1970s. Additional releases from Amistad from late January through the end of February lowered their levels to record lows, with the total water storage just below 21 percent of conservation capacity. The spring temperature and precipitation forecast, especially headed into April and May, did not look favorable for any relief – and water restrictions remained an issue unless there were dramatic increases in inflows to the Mexican and USA Rio Grande Basin watershed.

As for temperature…while the mid-January freeze/hard freeze put a dent in the long-term above average trends, "dent" is all it was – courtesy of the event only lasting two full days, and with daytime temperatures recovering nicely following the final morning of subfreezing temperatures on the 17th. For the season, temperatures were about 1 degree above the 1991-2020 average – a possible harbinger of much warmer conditions to come this spring and summer. For Brownsville, Harlingen, and McAllen, winter 2023/2024 ended up among the top 25 warmest on record.