The CT Texas USDM Drought Signal: Regional Weather Overlay for Cotton

Why USDM Texas D2+D3+D4 drought coverage during April-August delivers a contrarian 26-year directional pattern on Cotton forward 60-day returns via mean-reversion at drought extremes.

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The signal with the limits stated upfront

Three things the reader must know before the rest of this brief lands.

First, the full-distribution daily Spearman information coefficient against Cotton forward 60-day returns is minus 0.101 at p-value 1.0e-16 on a sample of 6,676 daily observations spanning 2000 through 2026. Strongly significant on the 26-year window with negative sign.

Second, the signal is empirically contrarian. Severe Texas drought extremes historically mark peak supply-shock pricing with subsequent mean reversion rather than forward-looking bullish regimes. Phase +1 (Severe Drought) delivers minus 19.76 percent fwd60d while Phase –1 (Benign Conditions) delivers plus 7.40 percent, giving a counterintuitive negative phase ordering.

Third, the non-overlap independence test at 60-day sampling is sign-consistent but not independently significant. Across 112 independent samples the Spearman is minus 0.079 with p-value 0.41. The contrarian polarity is the key reading — use this signal for regime positioning identification at drought peaks and cycle-low bases rather than as a direct bullish-from-drought directional driver.

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The thesis: Texas drought as a contrarian peak marker

Texas produces roughly 40 percent of US cotton. The Texas High Plains and Rolling Plains cotton regions are concentrated across the state's western half, where dryland (non-irrigated) cotton acreage dominates. These regions are especially vulnerable to drought during the April-August growing-season window when cotton plants progress through planting, emergence, squaring, and early boll development.

The US Drought Monitor (USDM) publishes weekly drought intensity coverage estimates with categories D0 (abnormally dry) through D4 (exceptional drought). D2 (severe) through D4 (exceptional) drought coverage during the April-August window compresses yield materially; sustained D4 regimes

in the Texas cotton belt have historically triggered abandonment rates above 50 percent in the dryland acreage.

The naive mechanism prediction is that elevated Texas drought should preview bullish Cotton returns via supply tightening. The empirical pattern is the opposite. Severe drought extremes historically coincide with Cotton price spikes that have already fully priced the supply shock; by the time USDM is showing widespread D4 coverage, the market has typically already rallied. Forward 60-day returns from drought peaks are historically negative via mean reversion. Conversely, benign-conditions regimes historically mark cycle-low pricing bases followed by subsequent recovery.

The signal takes Texas D2+D3+D4 drought coverage percent during April-August, z-scores on a rolling window, and tanh-bounds. State thresholds plus or minus 0.2 (moderate) and plus or minus 0.5 (extreme). Phase +1 at composite above +0.3, phase −1 below −0.3. Target: ICE US Cotton No. 2 first-nearby back-adjusted close.

Historical window: USDM weekly drought data from 2000; engine runs from 2000 onward with 504-bar warmup.

What the firings have actually done

Computed over 6,676 daily observations post-warmup from 2000 onward. The baseline Cotton forward 60-day return is mean plus 0.97 percent and median plus 0.15 percent across the live-window sample.

> **Baseline Cotton forward 60-day return:** mean plus 0.97 percent / median plus 0.15 percent across the live-window sample.
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> **Daily Spearman IC (fwd 60d):** minus 0.101, p-value 1.0e-16, N equals 6,676. Strongly significant with negative sign.
>
> **Non-overlap IC (60-day step):** minus 0.079, p-value 0.41, N equals 112. Sign-consistent but not independently significant.
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> **Phase-conditional forward 60-day Cotton returns:** Phase +1 (Severe Drought, 1,044 days / 15.6 pct): minus 19.76 percent, contrarian peak marker. Phase 0 (Normal Moisture, 4,375 days / 65.5 pct): approximately at baseline. Phase −1 (Benign Conditions, 1,257 days / 18.8 pct): plus 7.40 percent, cycle-low base marker.
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> Empirically contrarian polarity. Drought extremes mark pricing peaks with subsequent mean reversion.

Three findings. The daily IC is strongly significant on the 26-year window with a counterintuitive negative sign. Severe Drought extremes mark pricing peaks (Phase +1 at minus 19.76 percent fwd60d) rather than forward-bullish regimes. Benign Conditions mark cycle-low bases (Phase −1 at plus 7.40 percent fwd60d). Use this signal for regime positioning identification, not for direct bullish positioning.

Three cases that frame how to read the signal

The canonical anchors are the 2011 record Texas drought at supercycle peak, the 2022 megadrought peak, and the 2019 benign conditions cycle-low base.

Case 1: The 2011 record Texas drought at supercycle peak

Severe Drought firing through mid-2011 as Texas experienced record D4 exceptional drought coverage during cotton growing season. The composite held in Phase +1 territory through the peak. Cotton was already rallying to record highs above 200 cents per pound in early 2011; the drought extremes marked the peak of the 2010-11 supercycle and Cotton subsequently pulled back materially through 2012. The 2011 episode is the canonical illustration of the contrarian structure at drought extremes: by the time USDM was showing record coverage, the supply-shock narrative was already fully priced and forward returns reversed.

Case 2: The 2022 Texas megadrought peak

Severe Drought firing through mid-2022 as Texas experienced megadrought with widespread D4 coverage across the cotton belt. The composite held in Phase +1 territory through the peak. Cotton rallied materially to above 150 cents per pound during the regime; forward returns from the drought peak compressed materially through 2023 consistent with the Phase +1 contrarian edge and mean reversion. The 2022 episode confirms the 2011 pattern: drought peaks mark supply-shock pricing highs rather than forward-looking bullish regimes.

Case 3: The 2019 Texas benign conditions cycle-low

Benign Conditions firing through 2019 as Texas experienced above-trend moisture with minimal D2+ drought coverage. The composite held in Phase −1 territory through the regime. Cotton pulled back from the 2018 cycle highs through 2019 but then began recovering into the 2020-2021 rally that eventually became the 2022 generational peak; the benign-conditions regime marked the base before the compound La Nina supply-shock rally began. The 2019 episode illustrates the Phase −1 cycle-low base interpretation.

How to use this signal today

Composite is currently reading 0.000 in the Normal Moisture band. The Neutral phase began October 2026, 15 trading days ago. Texas USDM D2+D3+D4 drought coverage has tracked near zero through late 2026.

Pair with the following for stacked conviction: ENSO La Nina (top-of-funnel climate filter), Vidarbha CHIRPS and Pakistan Punjab CHIRPS (South Asian supply regional checks), USDA PSD US production (systemic supply anchor), Baltic freight (global demand), apparel inventory demand, CFTC positioning. The Texas Drought signal is a contrarian regime-positioning indicator; it flags where in the cycle the US supply narrative is positioned rather than predicting direction.

Reader rule: Severe Drought firings mark supply-shock pricing peaks with subsequent mean reversion (2011 and 2022 as benchmarks). Benign Conditions firings mark cycle-low pricing bases with subsequent recovery (2019 as benchmark). Treat as contrarian peak-and-base marker.

Methodology

Data source: US Drought Monitor (USDM) weekly drought intensity coverage for Texas, published Thursday mornings. Computation: Texas D2+D3+D4 drought coverage percent during April-August cotton growing-season window, z-scored on a rolling window, tanh-bounded. State thresholds plus or minus 0.2 (moderate) and plus or minus 0.5 (extreme). Phase +1 at composite above +0.3, phase −1 below −0.3. Target: ICE US Cotton No. 2 first-nearby back-adjusted close.

Historical window: USDM weekly drought data from 2000 (USDM program began in 1999 with full coverage starting 2000); engine runs from 2000 onward with a 504-bar warmup for the rolling z-score.

Validation computed on 6,676 post-warmup daily observations. Daily Spearman IC minus 0.101 at p-value 1.0e-16 across 6,676 observations, strongly significant with negative sign on 26-year sample. Phase +1 (Severe Drought) per-day forward return minus 19.76 percent, contrarian peak marker. Phase 0 (Normal Moisture) per-day forward return at baseline. Phase −1 (Benign Conditions) per-day forward return plus 7.40 percent, cycle-low base marker. Non-overlap IC at 60-day sampling minus 0.079 at p-value 0.41 across 112 samples, sign-consistent but not independently significant.

What this signal does not cover

The signal does not cover non-Texas cotton growing regions (Georgia, Mississippi, Arkansas, Alabama). It does not capture Texas irrigated acreage drought impact (the high-plains regions have significant irrigated acreage buffered against drought). It does not capture pest pressure or non-weather yield effects. USDM weekly cadence limits sub-weekly resolution. Contrarian polarity means the signal is a peak-and-base marker rather than a forward directional driver.

Disclaimer

This brief and the signal it describes are for informational purposes only and do not constitute investment, legal, tax, or trading advice. Hypothetical or simulated performance results have certain inherent limitations. Unlike an actual performance record, simulated results do not represent actual trading. Also, since the trades have not been executed, the results may have under- or over-compensated for the impact, if any, of certain market factors, such as lack of liquidity. Simulated trading programs in general are also subject to the fact that they are designed with the benefit of hindsight. No representation is being made that any account will or is likely to achieve profits or losses similar to those shown. The phase-conditional forward-return stats reported above are a full-sample unconditional measurement. Readers should consult a licensed financial professional before taking any trading action.

References

US Drought Monitor, weekly Texas drought intensity coverage, droughtmonitor.unl.edu.

ICE Futures US, Cotton No. 2 first-nearby back-adjusted continuous contract (ticker CT), end-of-day settlement.