Issue #17 – August 15, 2025

In This Issue:

🌾 🚜 From South to North: Indiana's Corn Progress Update

(Jeferson Pimentel, Bruno Scheffer, Dan Quinn & Betsy Bower)

Corn Silking

Silking progress in the Corn Belt is nearly complete. Indiana reached **98%**, slightly above its 5-year average of 97% and up from 87% last week, showing a strong late push. Iowa and Illinois are both fully silking at **100%**, matching or exceeding their historical pace. See more in **interactive maps 1**.

Corn Dough

Development continues to advance but still varies by state. Indiana's crop is now **75%** in the dough stage, well ahead of last week's 33% and comfortably above its 5-year average of 69%. Iowa stands at **77%**, 8 points above average, while Illinois is at **77%**, matching its historical trend. See more in **interactive maps 3**.

Corn Dented:

Denting is progressing, especially in western states. Indiana reached **29%**, sharply higher than last week's 0% and well above its 5-year average of 17%. Iowa is at **31%** and Illinois at **29%**, both above their averages by several points. See more in **interactive maps 4**

Corn Condition

Indiana's crop condition improved slightly, with **53%** rated good and **27%** fair. Poor-to-very-poor ratings remain at 10%, indicating some lingering but not worsening stress. Iowa (58% good) and Illinois (55% good) remain in a similar range, with the eastern Corn Belt generally faring better than drought-hit areas farther west and south. See more in **interactive maps 2.**

Corn development in Indiana is slightly behind the 5-year average, with silking at 87% (vs. 90% average) and dough at 33% (vs. 36% average). No dented corn has been reported yet, which aligns with the typical delay at this stage. Crop conditions remain mostly stable, though 11% of the crops are rated poor to very poor, indicating localized weather stress; continued favorable weather will be critical to support yield potential and ensure timely maturity.

➡️ Let us know if we can help.

Interactive Maps 1. U.S. Corn **Silking** Progress (USDA-NASS)
Click on the dates below to see the corn emerged progress over time and the average:

Aug 10, 2024	Aug 3, 2025	Aug 10, 2025	Average (2020-2024)

Interactive Maps 2. U.S. Corn **Condition** (USDA-NASS)
Click on the categories below to see the corn condition at each U.S. state on Aug 10th.

Very Poor	Poor	Fair	Good	Excellent

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Interactive Maps 4. U.S. Corn **Dented** Progress (USDA-NASS)
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Purdue Corn Team Research Update

(Jeferson Pimentel & Daniel Quinn)

Root Sampling at R1 Growth Stage

Over the past few weeks, the Kernel research team completed sampling the last round of corn roots at the R1 (silking) growth stage for the 2025 season. These samples are being prepared for analysis focused on root architecture and nutrient uptake, which will provide valuable insights into how different hybrids perform under field conditions and fertilizer placement (Figure 1).

Greenhouse Phenotyping at Purdue University

At Purdue's Phenotyping Facility, a greenhouse experiment was conducted focused on high-throughput root phenotyping using hyperspectral imaging. Roots were scanned once a week to capture detailed spectral data, allowing for the monitoring of root health, development, and growth patterns over time. The hyperspectral imaging system used visible and near-infrared wavelengths (400–1000 nm) to collect non-destructive measurements of root traits, providing insights that would be difficult to obtain through traditional methods (Figures 2 and 3).

Figure 1. Scanning root at R2 growth stage using the imaging box at Beck's Hybrids facility center.

Figure 2. Corn plants in the growth chamber at the Purdue phenotyping facility.

Figure 3. Corn plant in the hyperspectral area at the Purdue phenotyping facility.

Insights into Hyperspectral Imaging for Root Phenotyping

Hyperspectral imaging enables the non-destructive assessment of root systems, capturing spectral signatures that reveal differences in root tissues and stress responses. This approach supports high-throughput analysis, allowing large numbers of samples to be monitored efficiently and providing a more complete picture of root system performance.

Future Directions

The next step involves integrating hyperspectral imaging data with traditional root sampling results to develop a comprehensive understanding of root system performance. Expanding the use of additional imaging modalities, such as X-ray CT scanning, may further enhance phenotyping capabilities. Ultimately, these insights aim to inform breeding programs and agronomic practices that improve crop resilience and yield.

R5 Corn: The Dent Growth Stage

(Bruno Scheffer & Daniel Quinn)

The corn crop across Indiana is now entering the **R5** growth stage, commonly known as the **"dent stage."** This period is marked by a visible dent (Figure 1) forming at the crown of the kernels as they begin to lose moisture and solidify starch. While it may feel like the crop is "home free," this final phase before maturity is still critical. A significant amount of grain yield is still being determined, making especially the environment the main player for establishing both final yield and quality.

Kernel Development: The Milk Line Tells the Story

The dent stage begins approximately 30 to 40 days after silking, once nearly all kernels have formed the characteristic dent at their crown. This dent appears as the kernel's starch content increases and its moisture content decreases (Abendroth et al., 2011; Larson, 2018). The R5 stage itself lasts about 30-33 days, requiring approximately 337 to 360 growing degree days (GDDs) to complete, depending on the hybrid's maturity (Brown, 1999).

To track progress through R5, agronomists and farmers monitor the **milk line** (Figure 2). This is the distinct boundary within the kernel that separates the solid, starchy endosperm from the liquid, milky portion. As the kernel matures and loses moisture, this line moves down towards the cob. Identifying the milk line is key to understanding the kernel's approximate moisture, its dry matter accumulation, and the time remaining until physiological maturity (R6).

Table 1. Kernel moisture (%), kernel dry matter (%), and approximate calendar days for milk line progression during the R5 growth stage of corn (Abendroth et al., 2011).`

R Stage	Grain Moisture	Kernel Dry Matter	Calendar Days
5.0	60%	45%	3
5.25 (1/4 Milk Line)	52%	65%	6
5.5 (1/2 Milk Line)	40%	90%	10
5.75 (3/4 Milk Line)	37%	97%	14
6.0 (Physiological Maturity)	35%	100%	59

A Critical Window for Yield

Figure 1: Appearance of dented kernels at the growth stage R5 at West Lafayette, IN.

It is a common and mistaken belief that the "crop is made" by the time it reaches the dent stage (Nielsen, 2021). However, at the beginning of R5, kernels have only accumulated about 45% of their final dry weight (Nielsen, 2021). This means that **50% to 55% of the final kernel dry weight is still to be added**.

During this time, the plant is rapidly moving stored carbohydrates from its vegetative tissues to the developing kernels. The health of the upper leaf canopy is especially important, as some research indicates it is responsible for at least 60% of the photosynthate required to fill the grain (Nielsen, 2021). A

stress-free grain fill period is essential to maximize yield potential. Stressors that can limit yield during R5 may include: water and nutrient stress, high temperatures, diseases, pests, etc.

The impact of stress is most severe at the beginning of the R5 stage. Research has shown that complete plant death at the start of R5 can reduce yield by about 41%, while the same event occurring at the half-milk line stage would only cause a yield loss of around 5% to 12% (Carter & Hesterman, 1990).

Hybrid Differences Matter

The type of corn hybrid planted adds another layer of complexity to R5 management. Modern short-stature hybrids often show higher nitrogen remobilization efficiency compared to traditional full-stature (taller) hybrids during the grain-filling period, what could indicate additional increase in root function enabling higher levels of soil nutrient exploration (Ordóñez et al., 2024).

Management Takeaways

Though corn has almost reached its final reproductive stage, there is still significant yield to be protected. It is important to continue scouting fields, pulling back husks, and checking the milk line's progress. This helps in gauging how much longer until maturity and understanding the potential impact of any late-season stresses. Recognizing the structural and physiological differences between short and full-stature corn necessitates tailored management to mitigate stress and optimize the grain-filling process, ensuring both high yield and superior grain quality.

References

Abendroth, L.J., R.E. Elmore, M.J. Boyer, and S.K. Marlay. 2011. Corn growth and development. Iowa State Univ. Extension publication PMR1009.

Brown, Greg A. 1999. Influence of Delayed Planting on Growing Degree Day Requirements of Corn (Zea mays L.) Hybrids During Grain Fill and Maturation. M.S. Thesis, Purdue University.

Carter, P.R., and O.B. Hesterman. 1990. Handling corn damaged by autumn frost (NCH-57). Purdue Univ. Extension. https://www.extension.purdue.edu/extmedia/NCH/NCH-57.html.

Larson, E. 2018. Identifying corn reproductive growth stages and management implications. Mississippi State Univ. Extension. https://www.mississippi-crops.com/2018/07/05/identifying-corn-reproductive-growth-stages-and-management-implications/.

Nielsen, R.L. (2021). Grain Fill Stages in Corn. Corny News Network. Purdue University. https://www.agry.purdue.edu/ext/corn/news/timeless/grainfill.html

Ordóñez, R., et al (2024). Short-statured maize achieved similar growth and nitrogen uptake but greater nitrogen efficiencies than conventional tall maize. Crop Science, 64(6), 3502-3520. https://doi.org/10.1002/csc2.21345

Quinn, D. (2021). Why The R5 Growth Stage In Corn Still Matters. Purdue University. Pest&Crop newsletter. https://extension.entm.purdue.edu/newsletters/pestandcrop/article/why-the-r5-growth-stage-in-corn-still-matters/

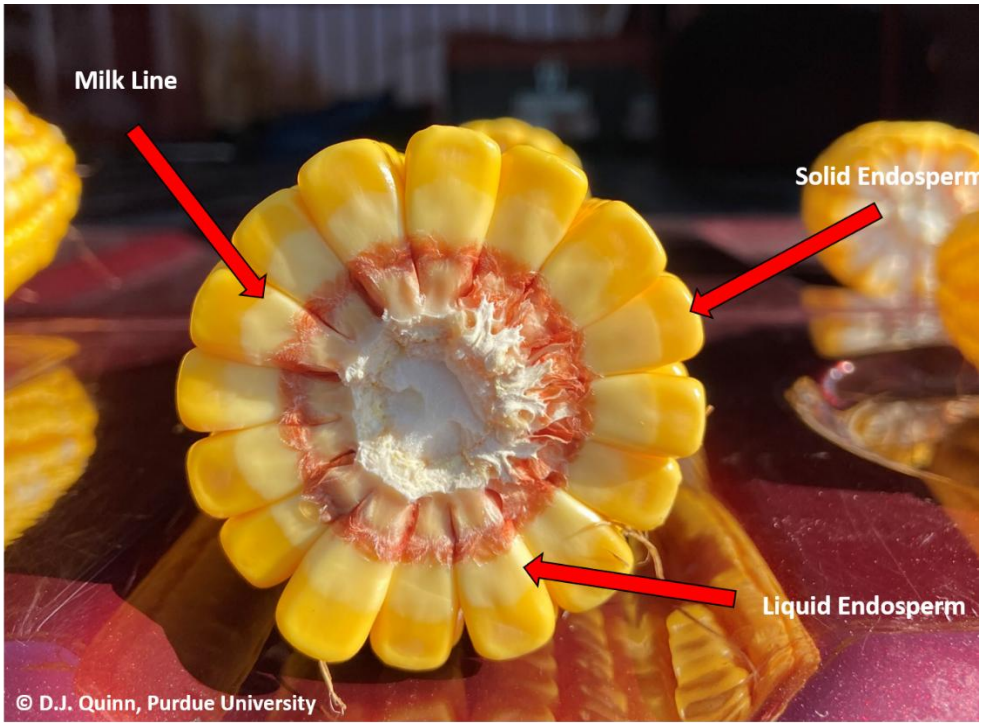

Figure 2: Solid endosperm, liquid endosperm, and milk line appearance in corn during the R5 growth stage. Photo by Dan Quinn (2021).

Corn Surges to Record Highs, Soybeans Dip Slightly in 2025 USDA August Forecast

(Jeferson Pimentel & Dan Quinn)

The USDA projects U.S. **corn production at 16.7 billion bushels, up 13% from 2024**, with a record 188.8 bu/acre yield. Record corn yields are forecast in several major states, including Indiana, Illinois, Iowa, and Minnesota. As of Aug. 3, 73% of the crop was rated good to excellent, 6 points higher than last year.

Soybeans are expected to reach 4.29 billion bushels, down 2% from last year, despite a record yield projection of **53.6 bu/acre**. Record soybean yields are anticipated in Arkansas, Illinois, Indiana, and Missouri, among others. USDA's forecast is based on interviews with nearly 15,000 producers. Updated numbers will be released in September after final acreage and yield surveys.

Farmer Takeaway:

Corn: Higher production and strong crop conditions may put downward pressure on prices, but good yields mean strong potential revenue if costs are managed.

Soybeans: Slightly lower production could support soybean prices, but record yields in many states could offset the drop.

Planning Tip: Monitor local crop conditions and market updates, as final September surveys may adjust forecasts.

U.S. Corn Production

(Michael Langemeier)

In the August WASDE report, USDA forecasted record corn yield and production. The report contained two large surprises. First, the 2025 corn yield was projected to be 188.8 bushels per acre. This projection is almost 8 bushels above trend yield and over 9 bushels higher than the previous record. Second, corn acreage was projected to be over 2 million acres higher than the previous estimate in the July report. Corn yields were expected to be over 200 bushels per acre and records in Minnesota, Iowa, Illinois, and Indiana. Combining the acreage and corn yield projections results in a projected production of 16.7 billion bushels, which is 12.6% higher than last year's production level (figure 1).

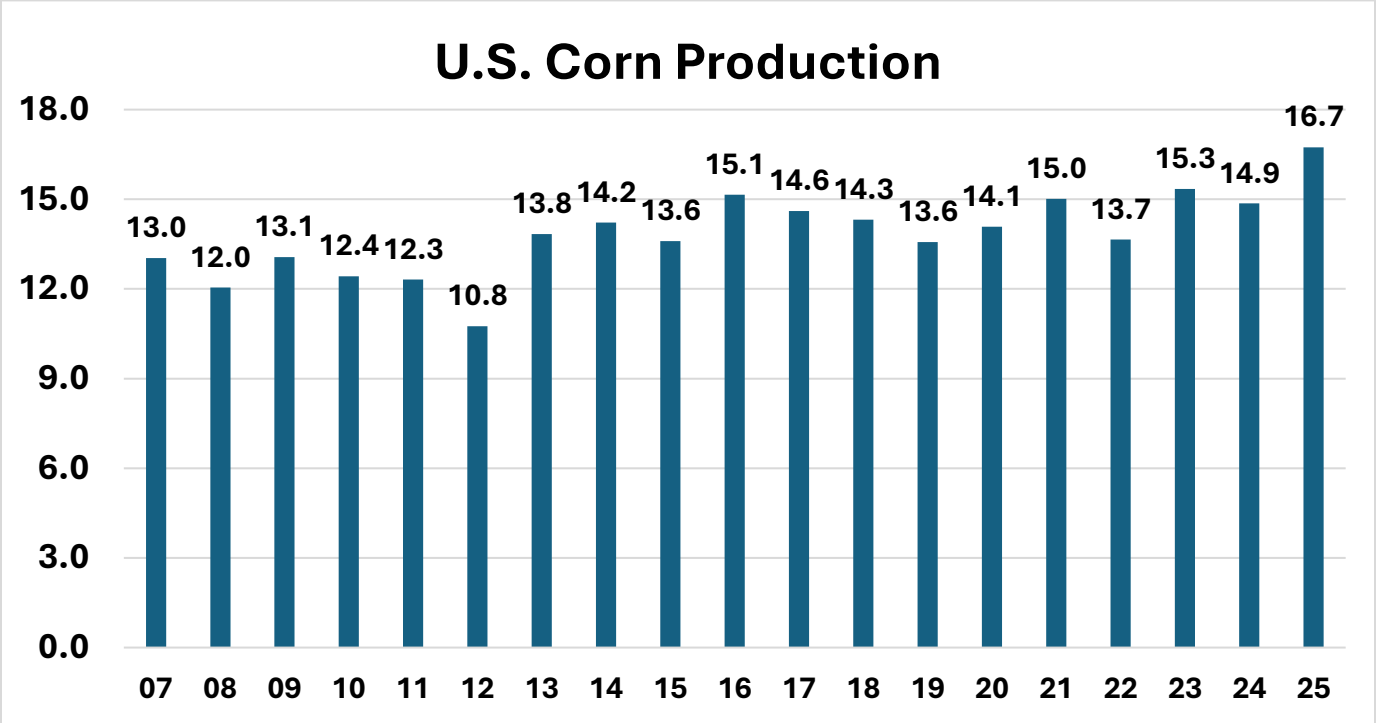

Figure 1. U.S. Corn Production. Source: WASDE Reports

Futures prices declined in response to the August report and the projected U.S. price for the 25/26 marketing year declined from $4.20 to $3.90. The projected ending stocks to use ratio for the 25/26 crop increased from 10.5% in July to 13.3% in August. The average stocks to use ratio and corn price since 2007 is 11.5% and $4.50 per bushel, respectively. The stocks to use ratio during the 2014 to 2019 period ranged from 12.6% to 15.7%. Average marketing year U.S. corn prices ranged from $3.36 to $3.70 during this period. Thus, cash price this fall is likely to below $4.00 per bushel. Unfortunately, the breakeven corn price is over 20% higher today than it was during the 2014 to 2019 period.

🌞 Drying expected to continue over the coming weeks!

(Austin Pearson)

Precipitation over the last 30 days has been very spotty, the usual narrative when dealing with summertime convection. Thunderstorms in northwestern Indiana provided relief from ongoing drought conditions in certain areas, with some locations receiving over 2 inches of rainfall above the 30-day (July 15-August 13) normal (Figure 1). Just south and east of this region, precipitation was up to 2 inches below normal for the same period. Additionally, central Indiana also shows increasing departures, with deficits reaching as much as 3 inches below normal in some places. Recently, many parts of Indiana have experienced less than 25 percent of their typical rainfall since July 31 (Figure 2), which is leading to drier conditions being reported. The bonus – I am back to mowing my yard every other week!

The US Drought Monitor observed some improvements in northwestern Indiana over recent weeks. Still, the persistent hot and dry conditions are beginning to shift areas in central and northern Indiana back toward drier conditions (Figure 3). The August 12 US Drought Monitor indicated that about 20 percent of the state was in either abnormally dry (D0) or moderate drought (D1) conditions, up just shy of 5 percent from last week. Areas of the state in D1 were up nearly 2 percent compared to the previous week.

How long will the dryness persist? The 7-day forecast for precipitation from August 14-21 suggests limited improvement, as most of the state expects less than 0.5 inches of rain (Figure 4). Some parts of northeast Indiana might receive up to an inch, however. Additionally, the Climate Prediction Center projects near-normal to below-normal rainfall across the entire state through the end of August, indicating that drying conditions could continue in the coming weeks. The good news is that temperatures will be close to normal or below average through the end of the month.

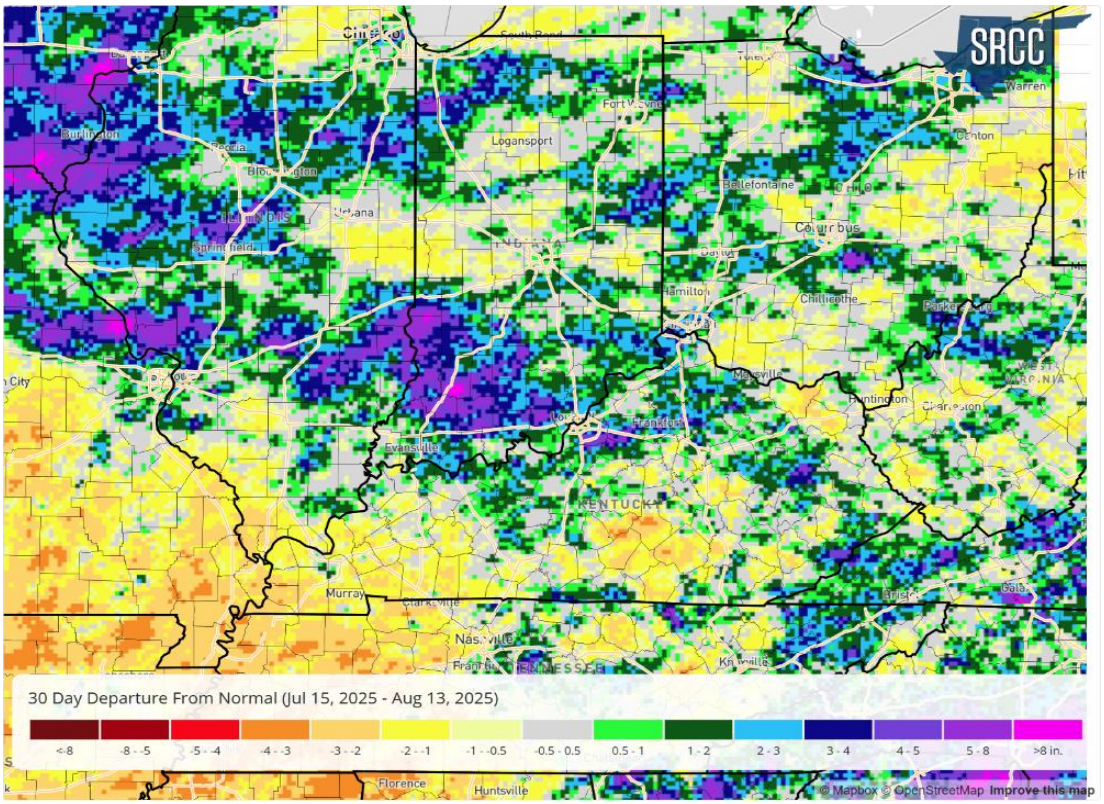

Figure 1. July 15 – August 13, 2025, accumulated precipitation departure from normal.

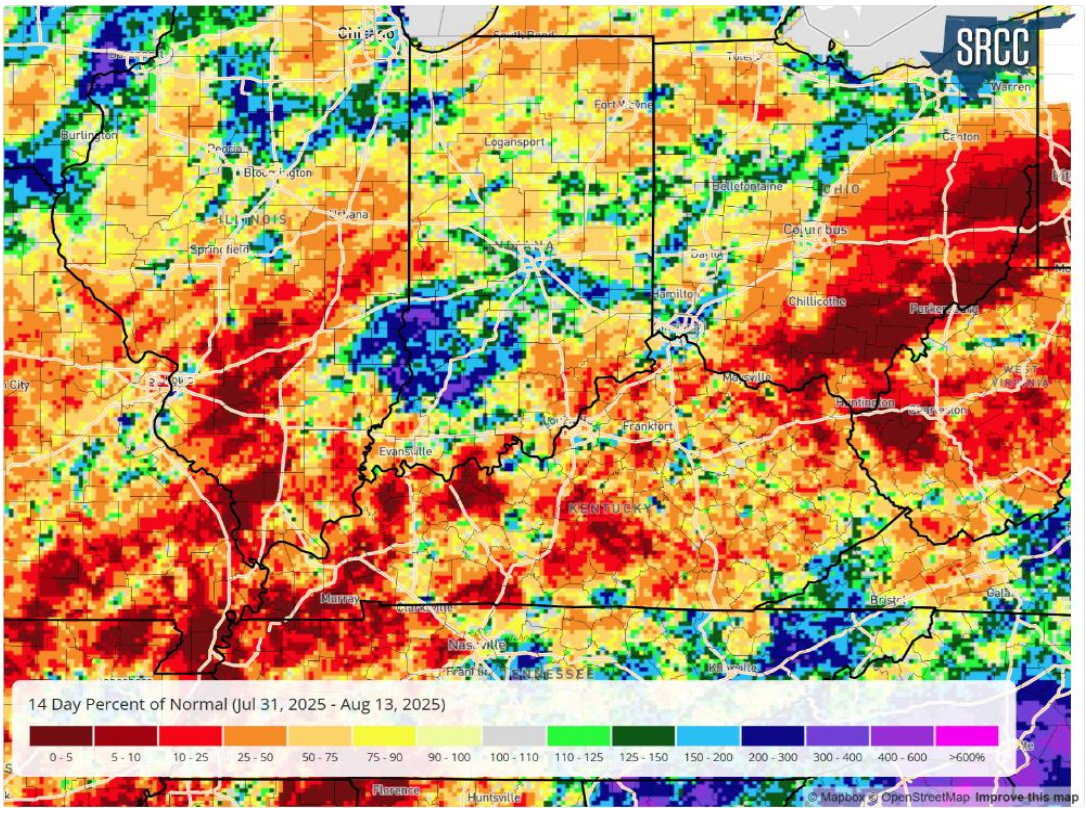

Figure 2. July 31 – August 13, 2025, accumulated precipitation departure from normal.

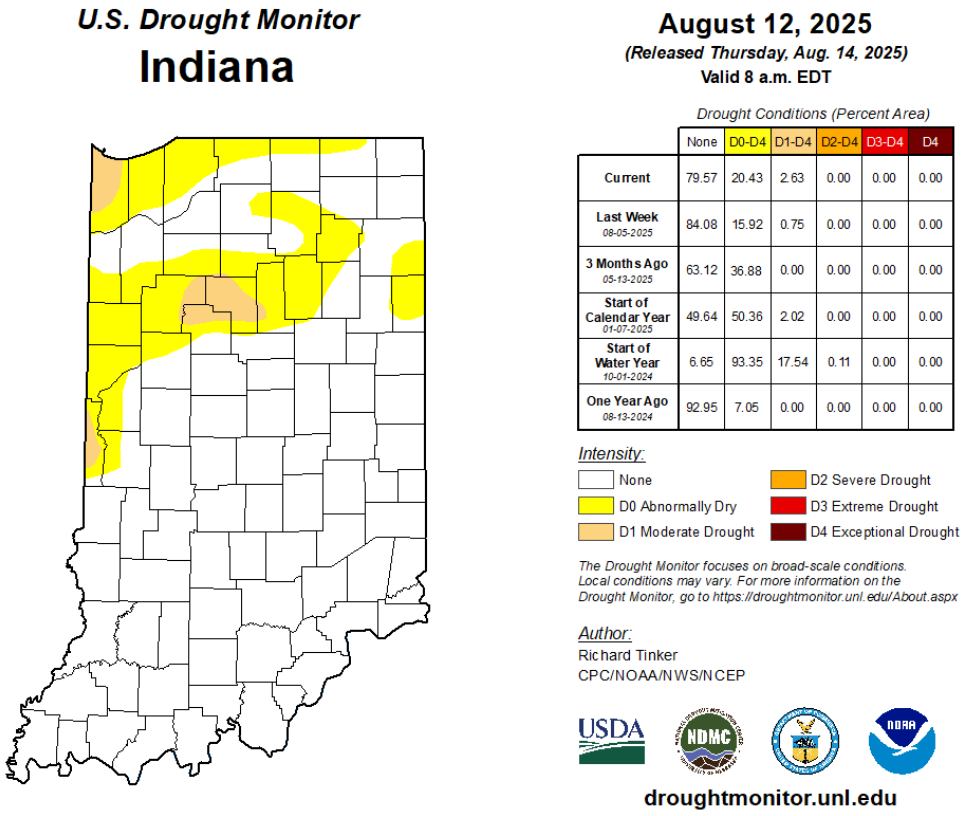

Figure 3. The August 12, 2025, US Drought Monitor Map.

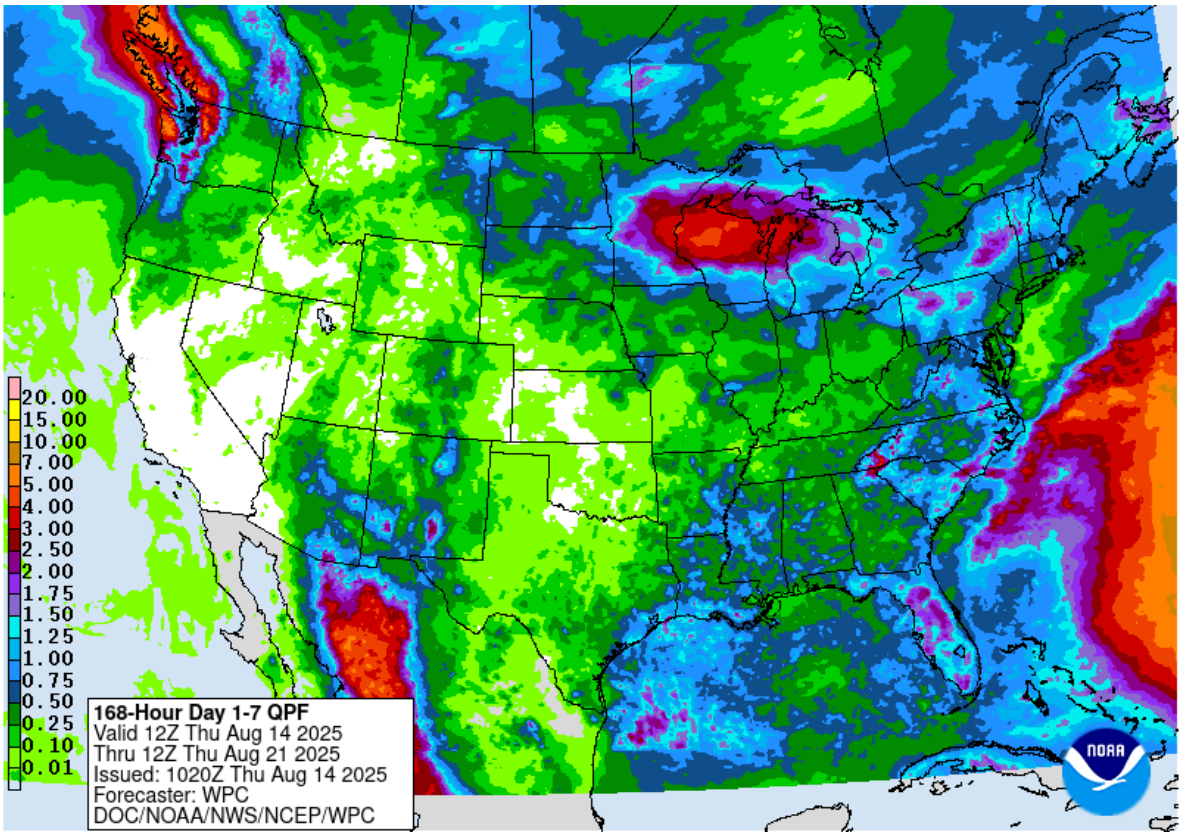

Figure 4. August 14-21, 2025, quantitative precipitation forecast.

Acknowledgments

The authors greatly appreciate the feedback and contributions of all growers, county agents, consultants, and corn industry stakeholders.

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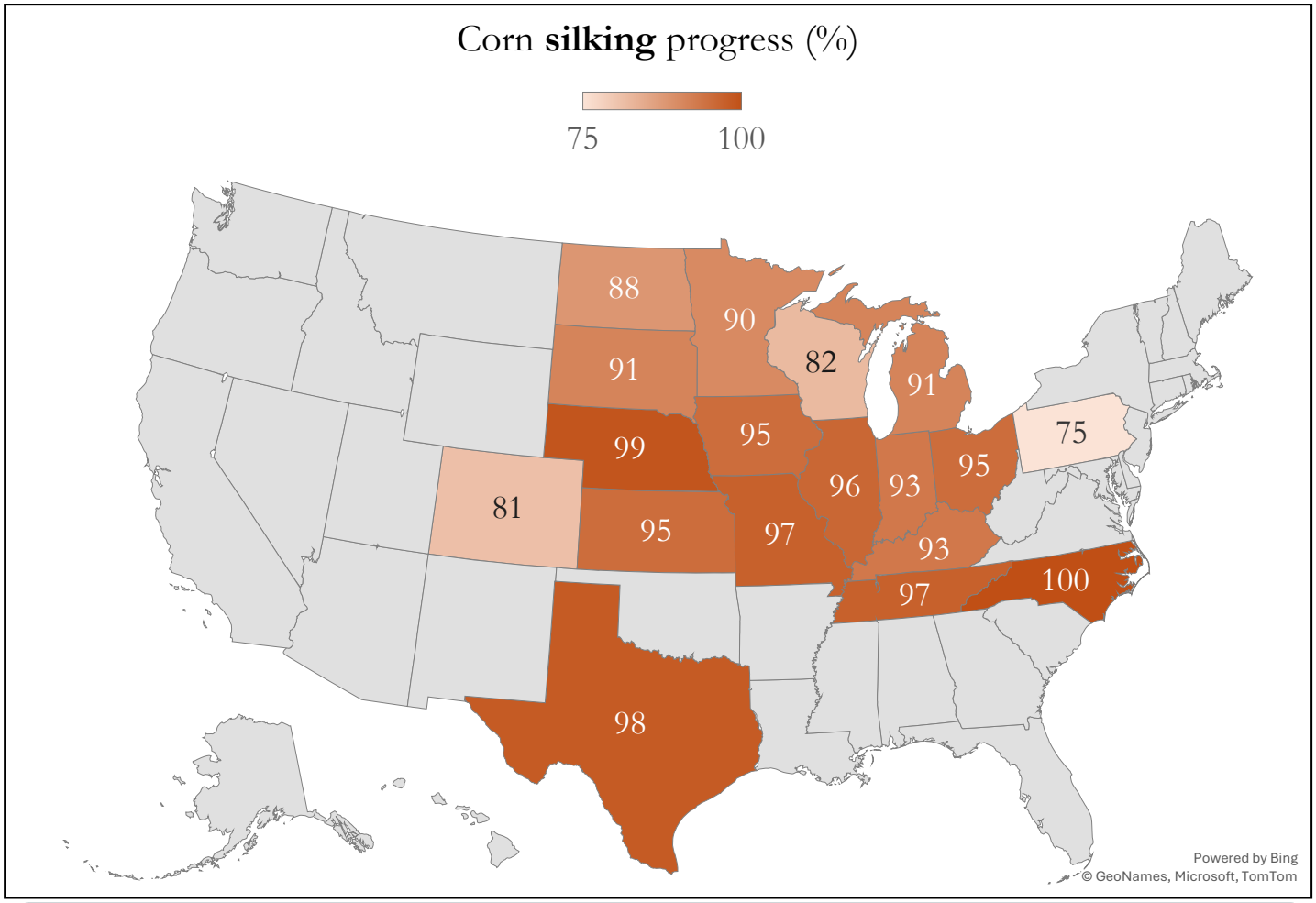

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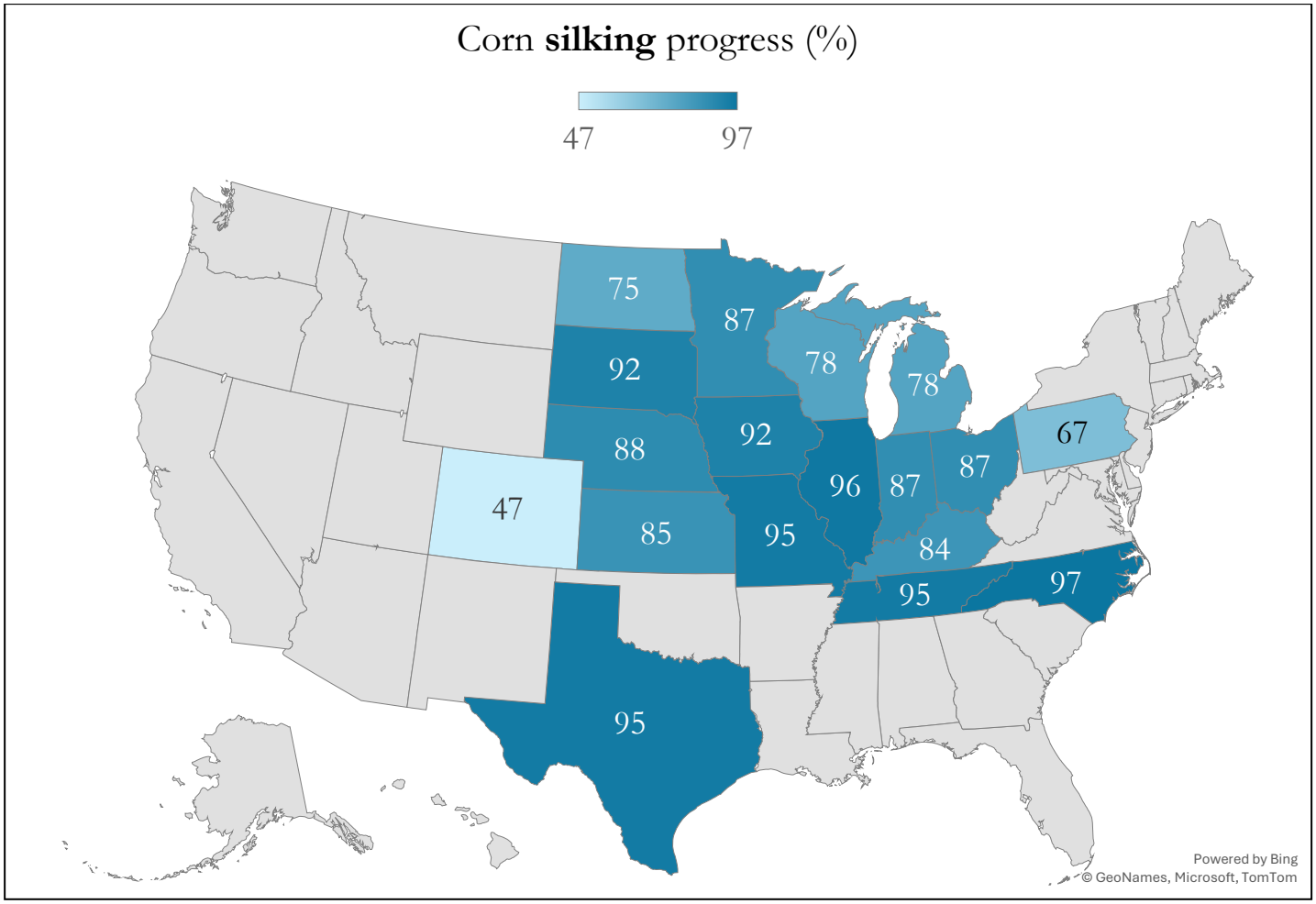

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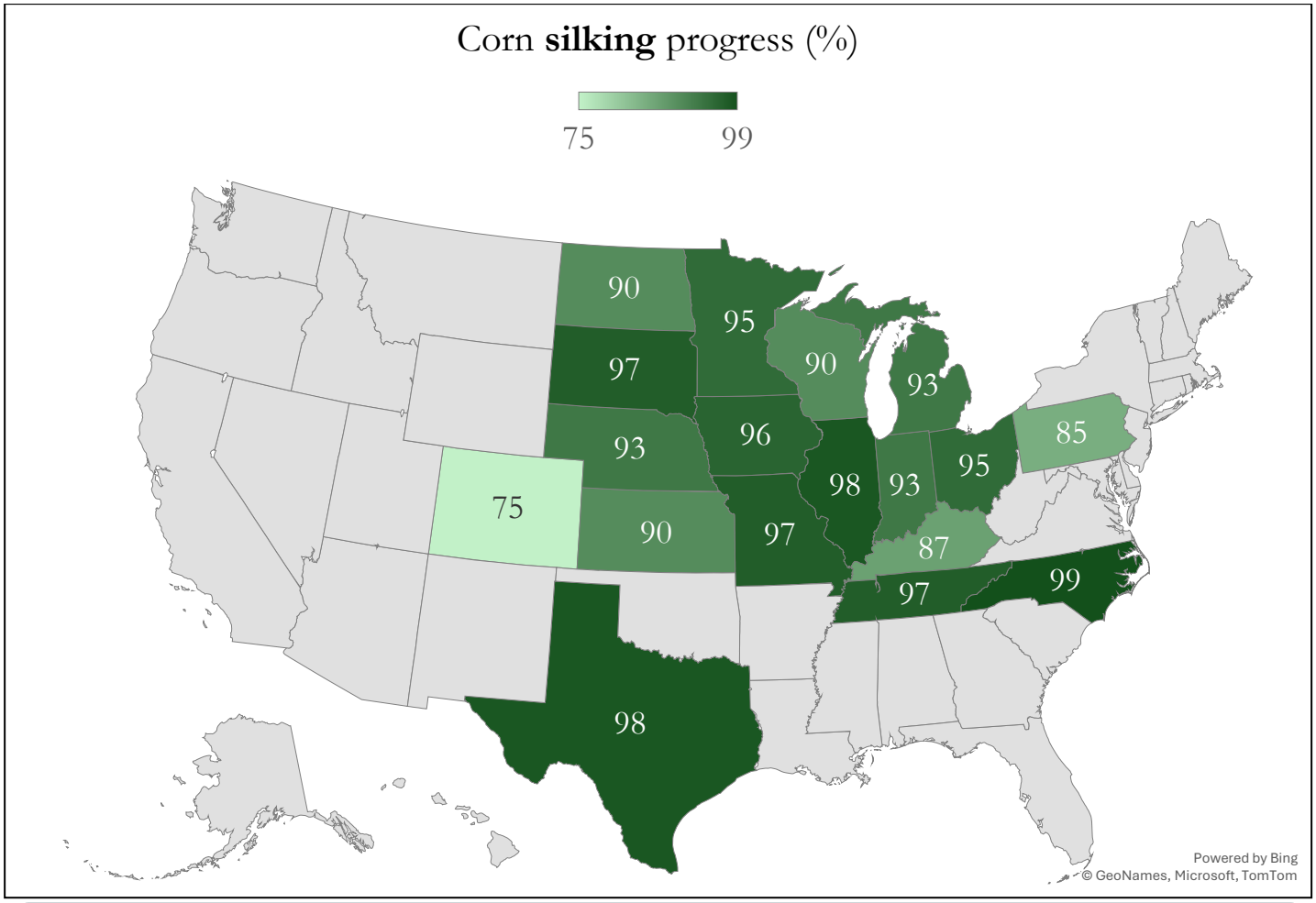

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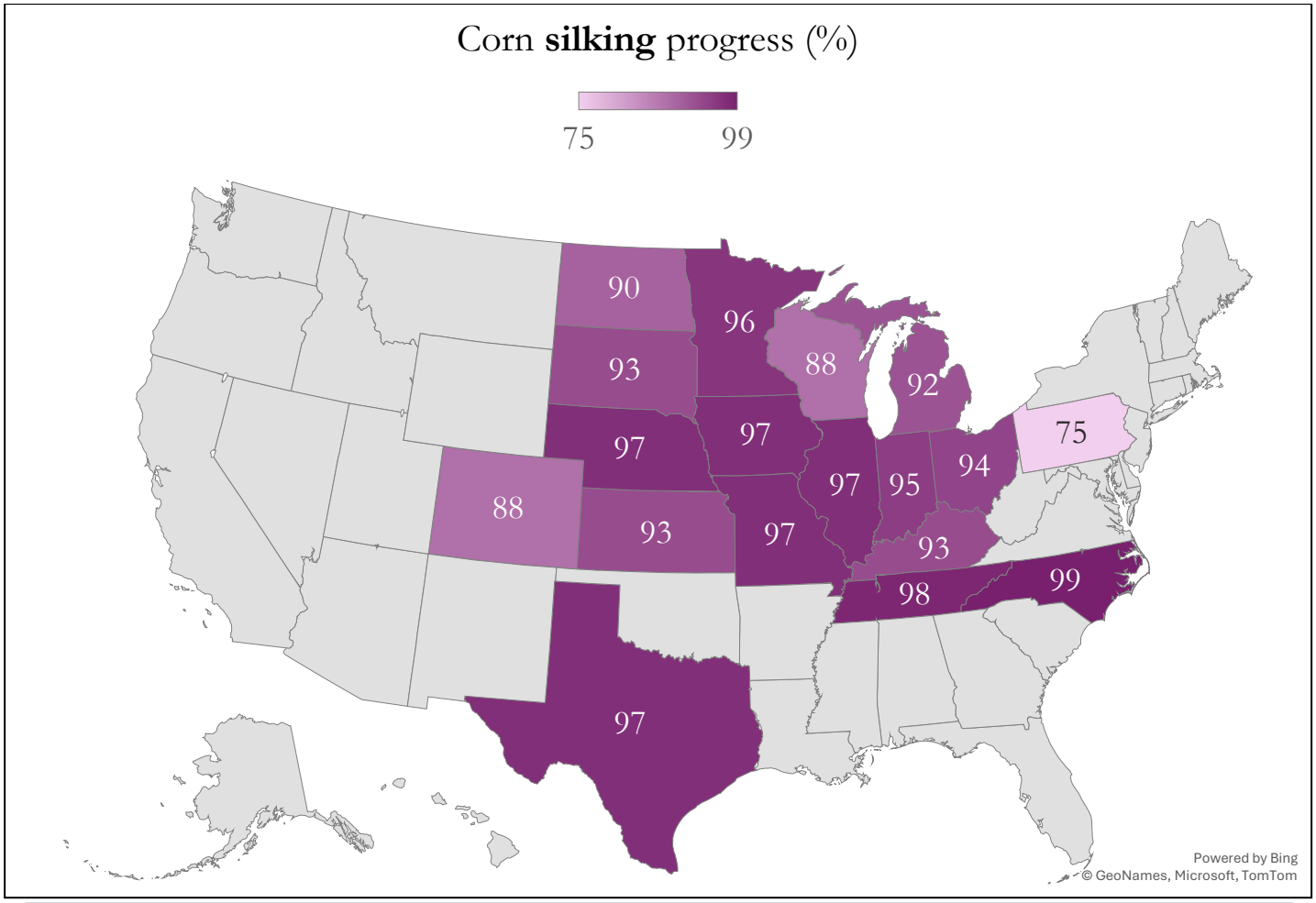

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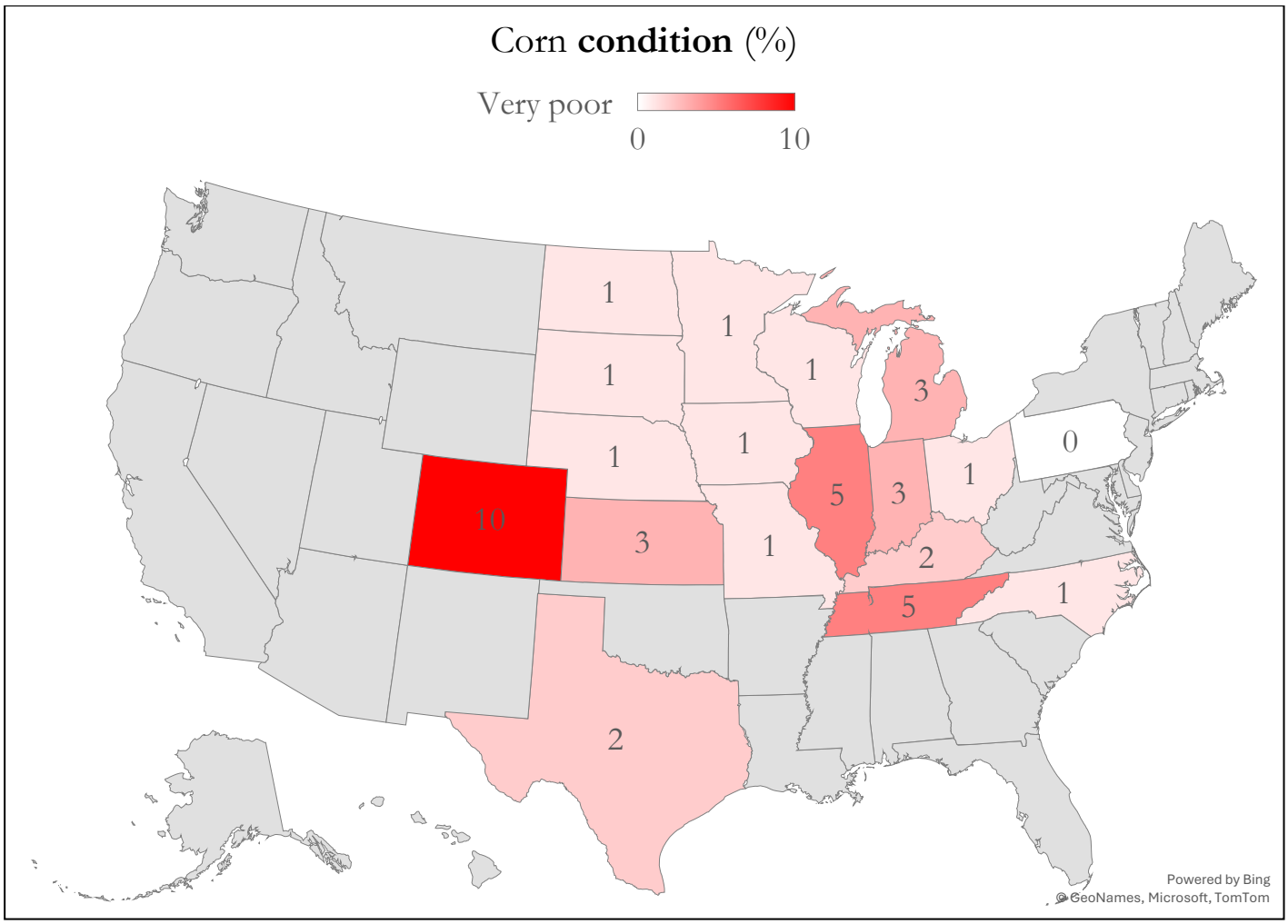

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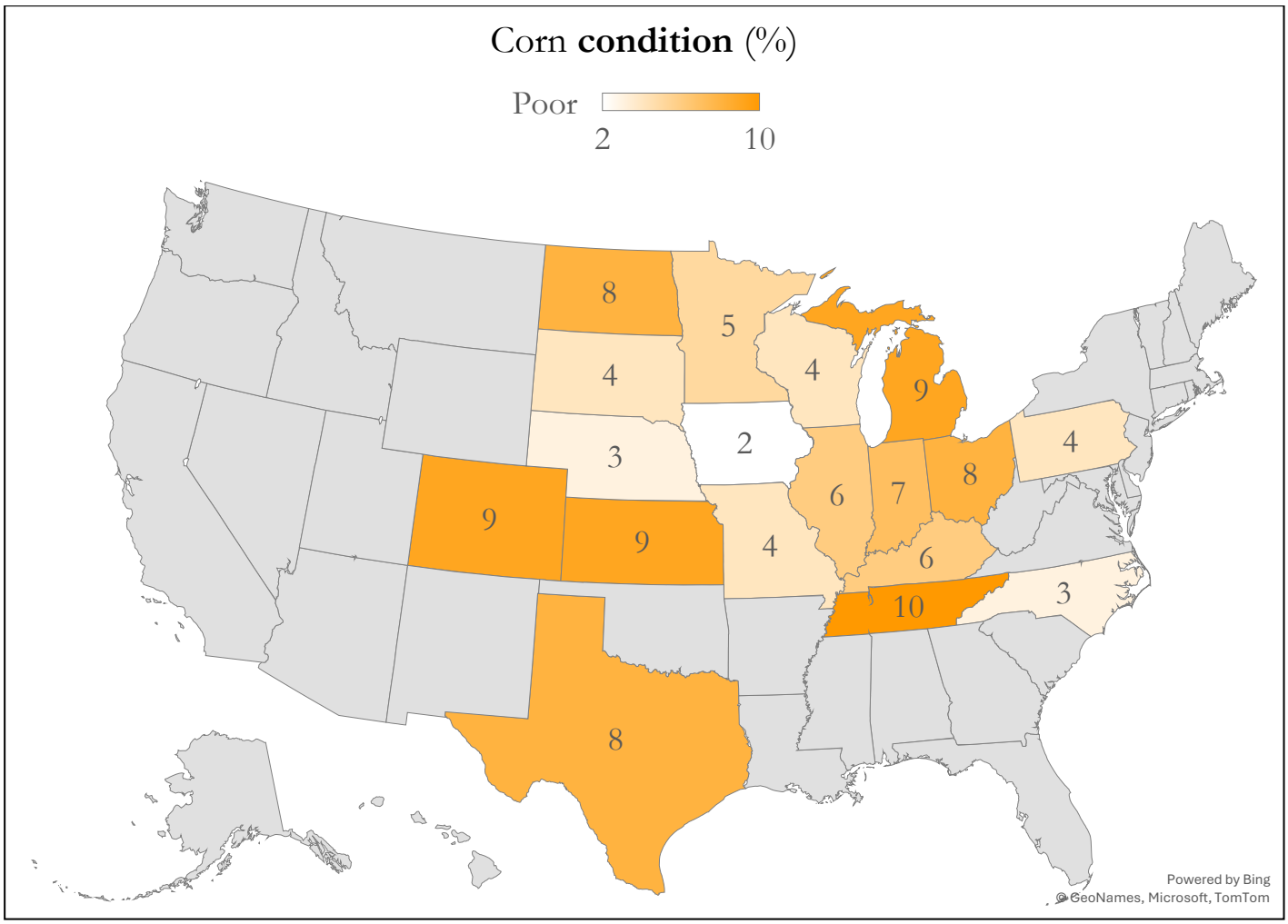

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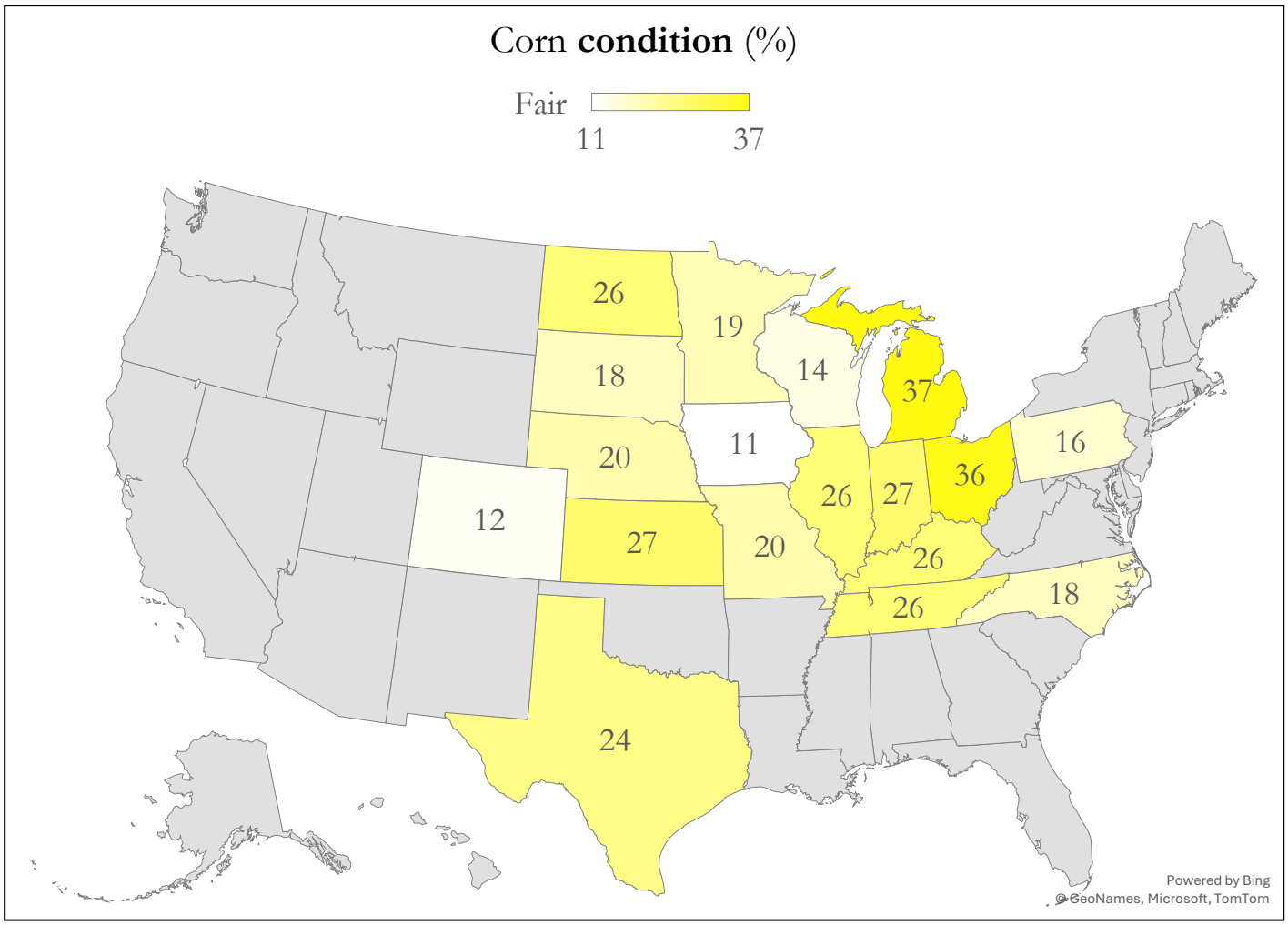

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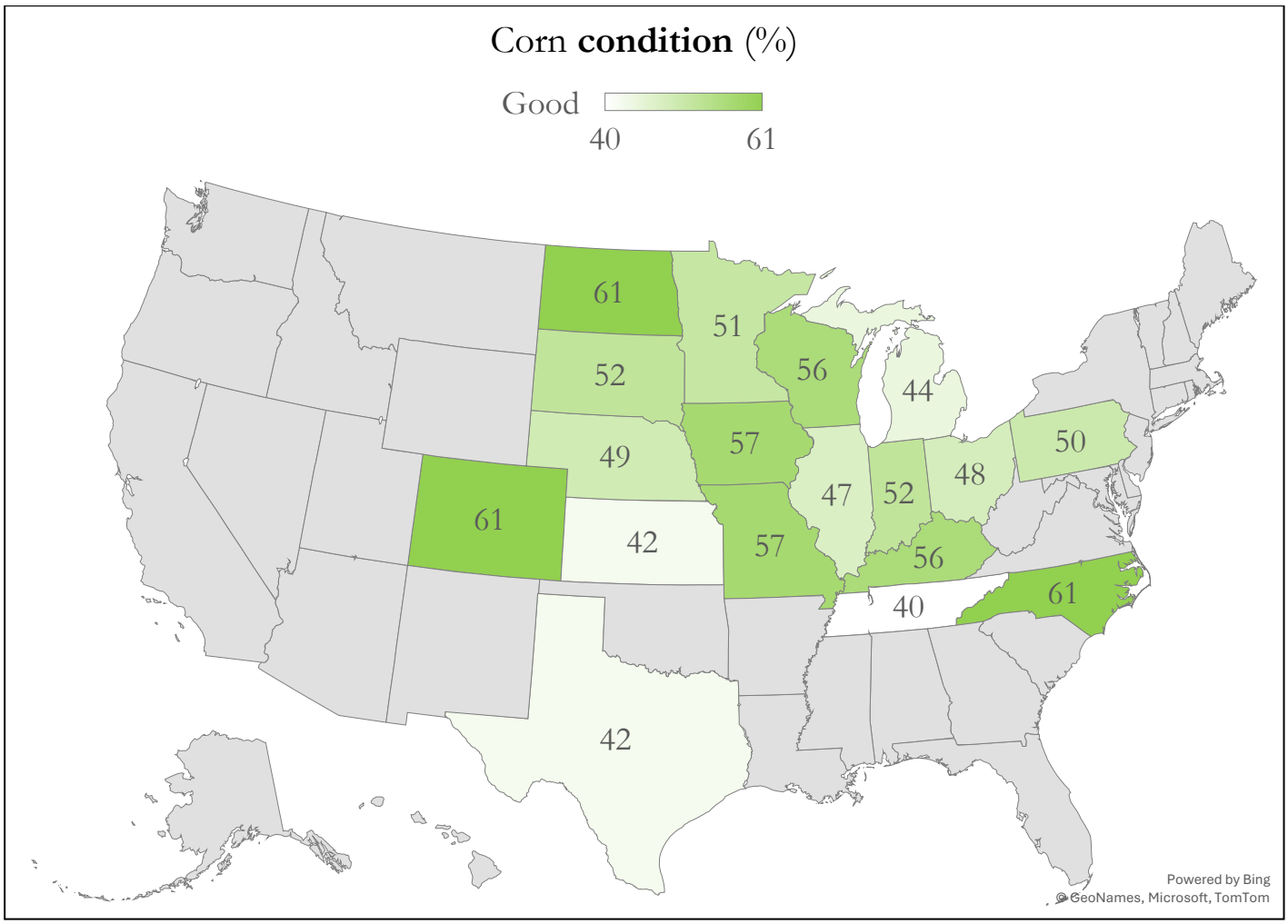

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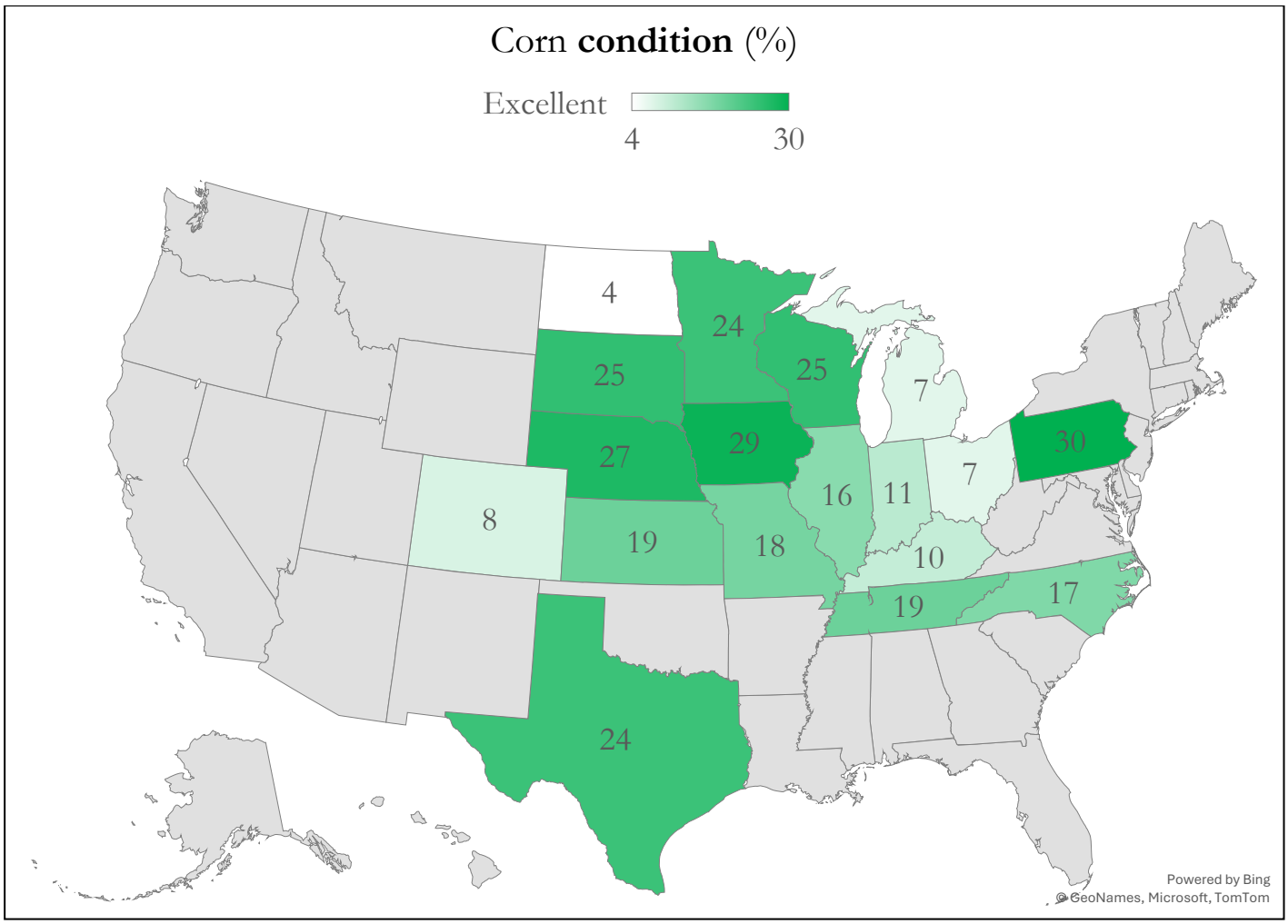

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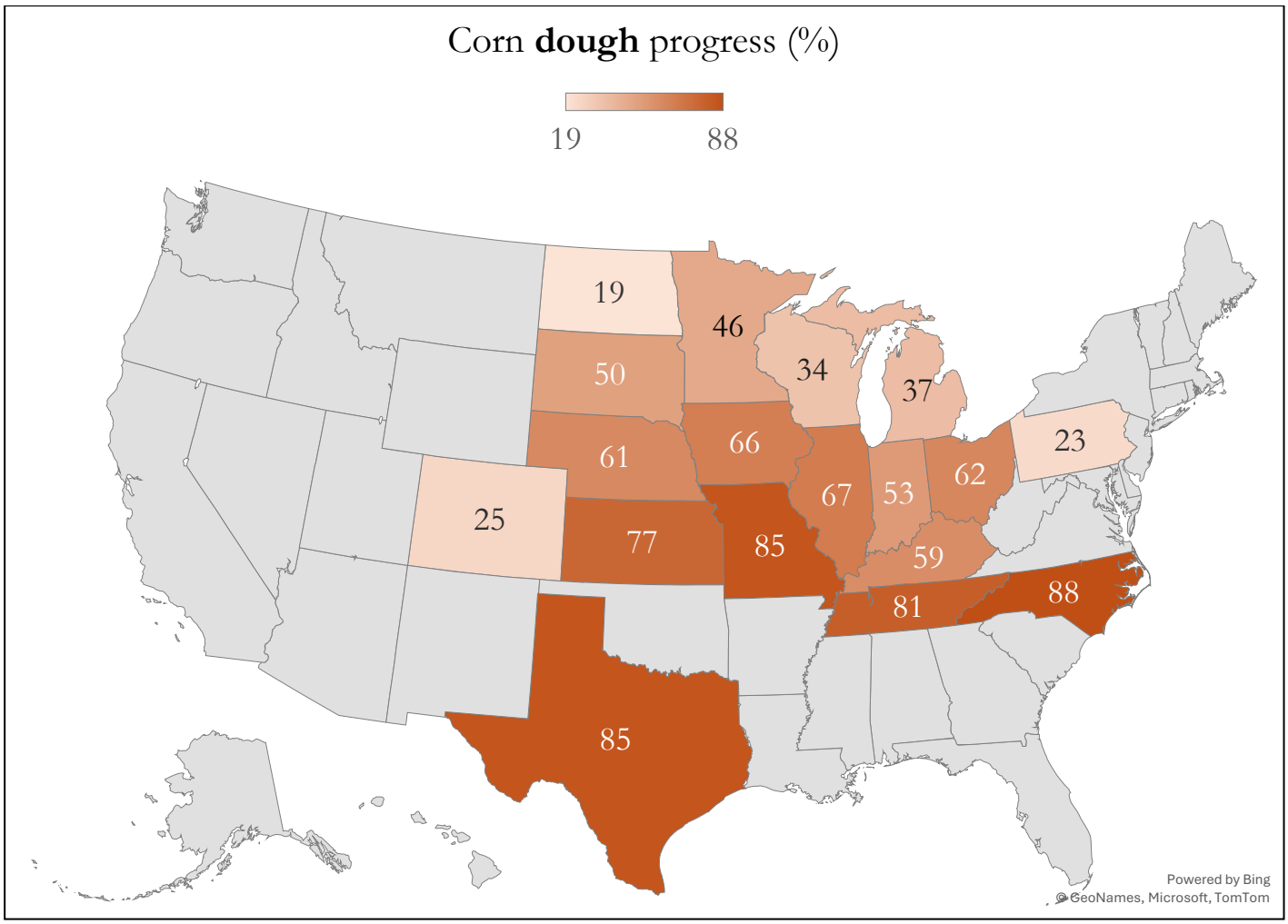

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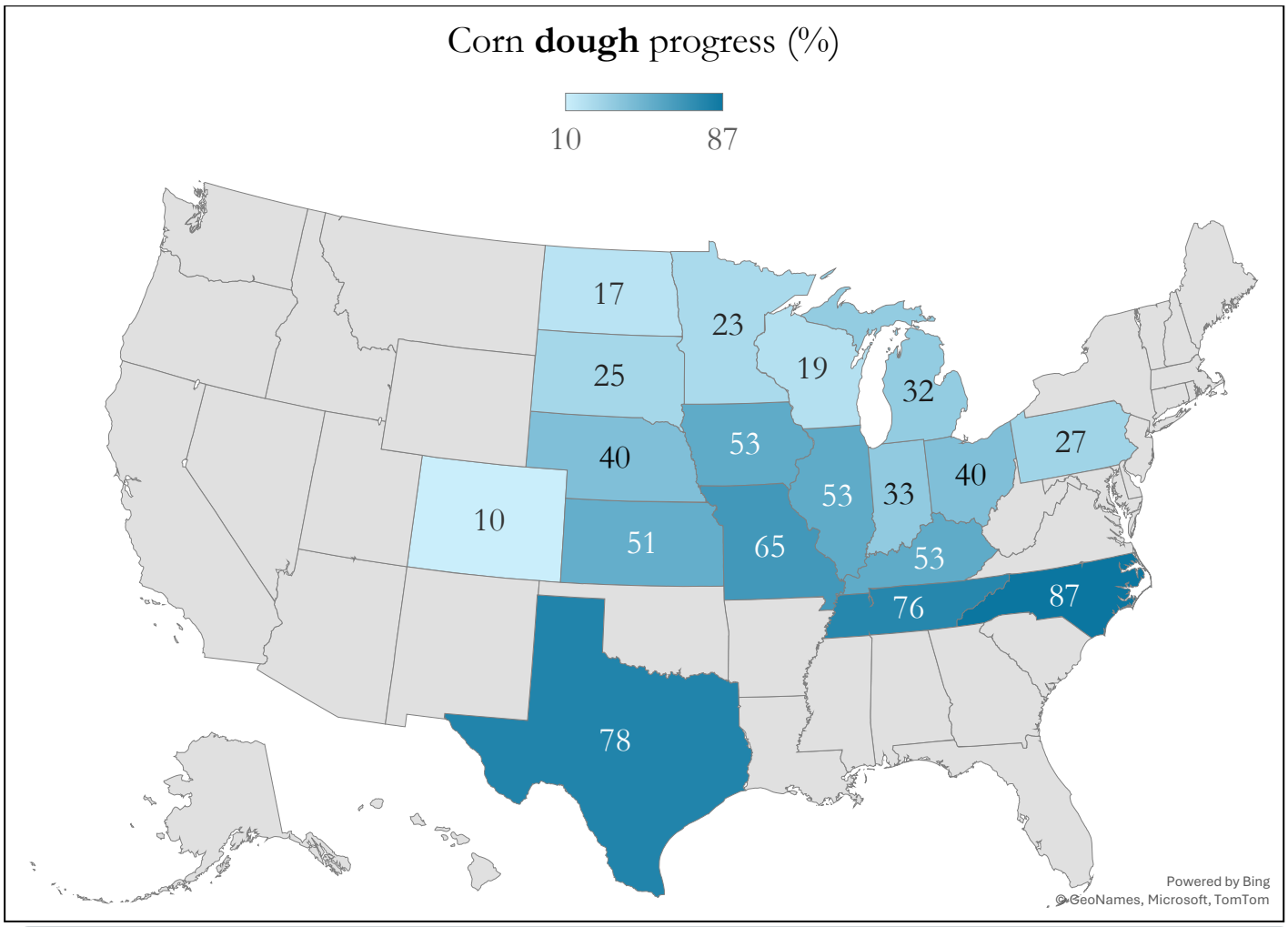

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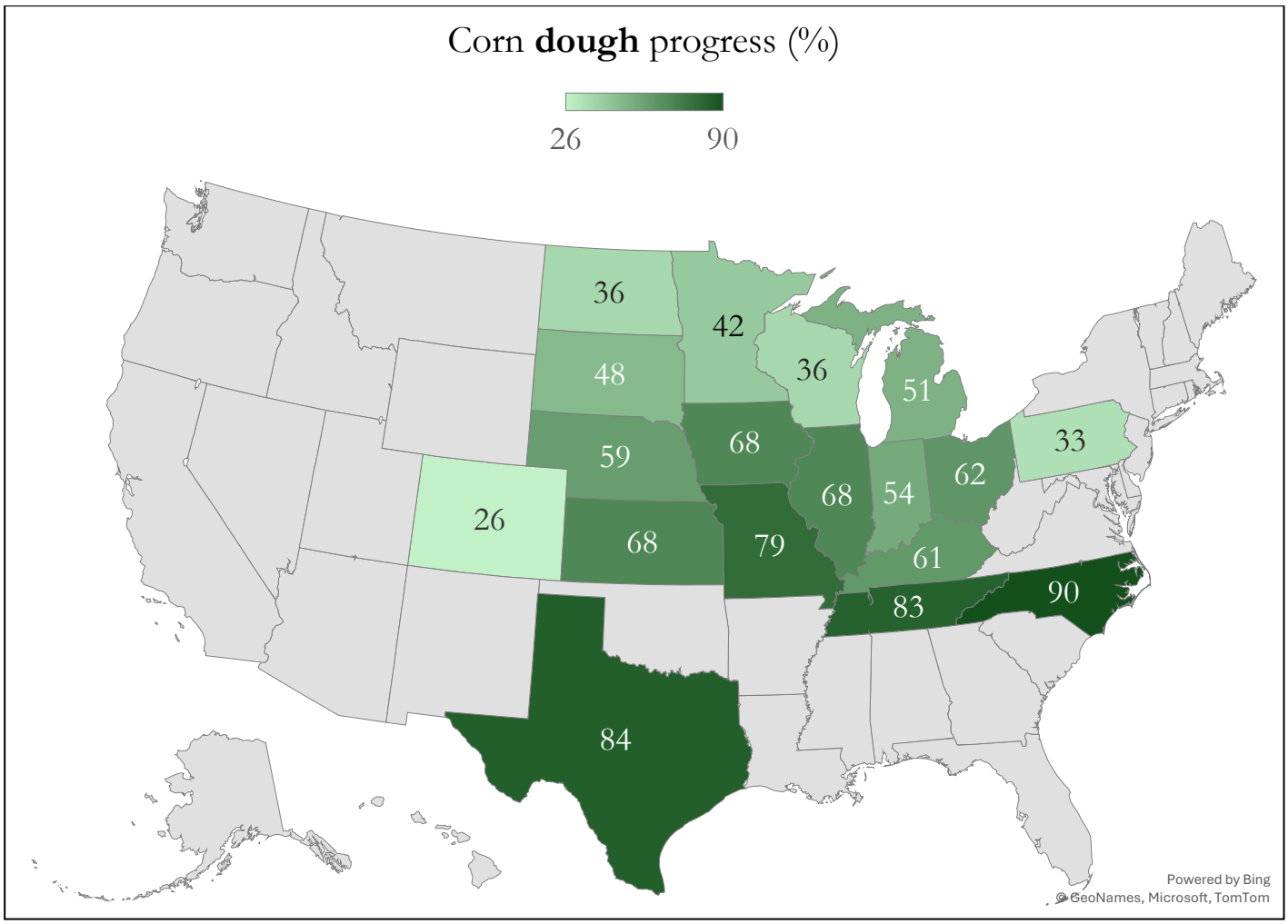

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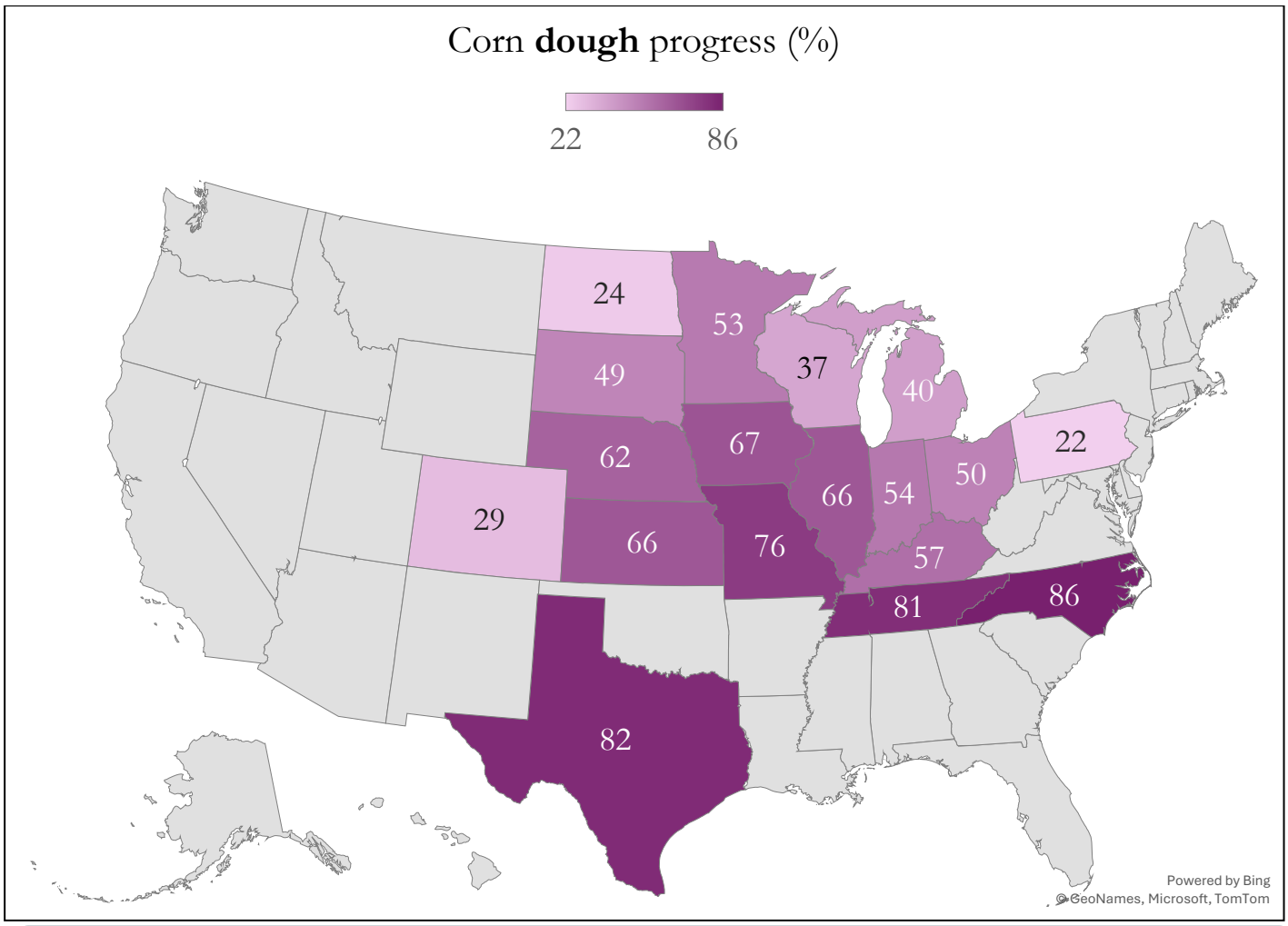

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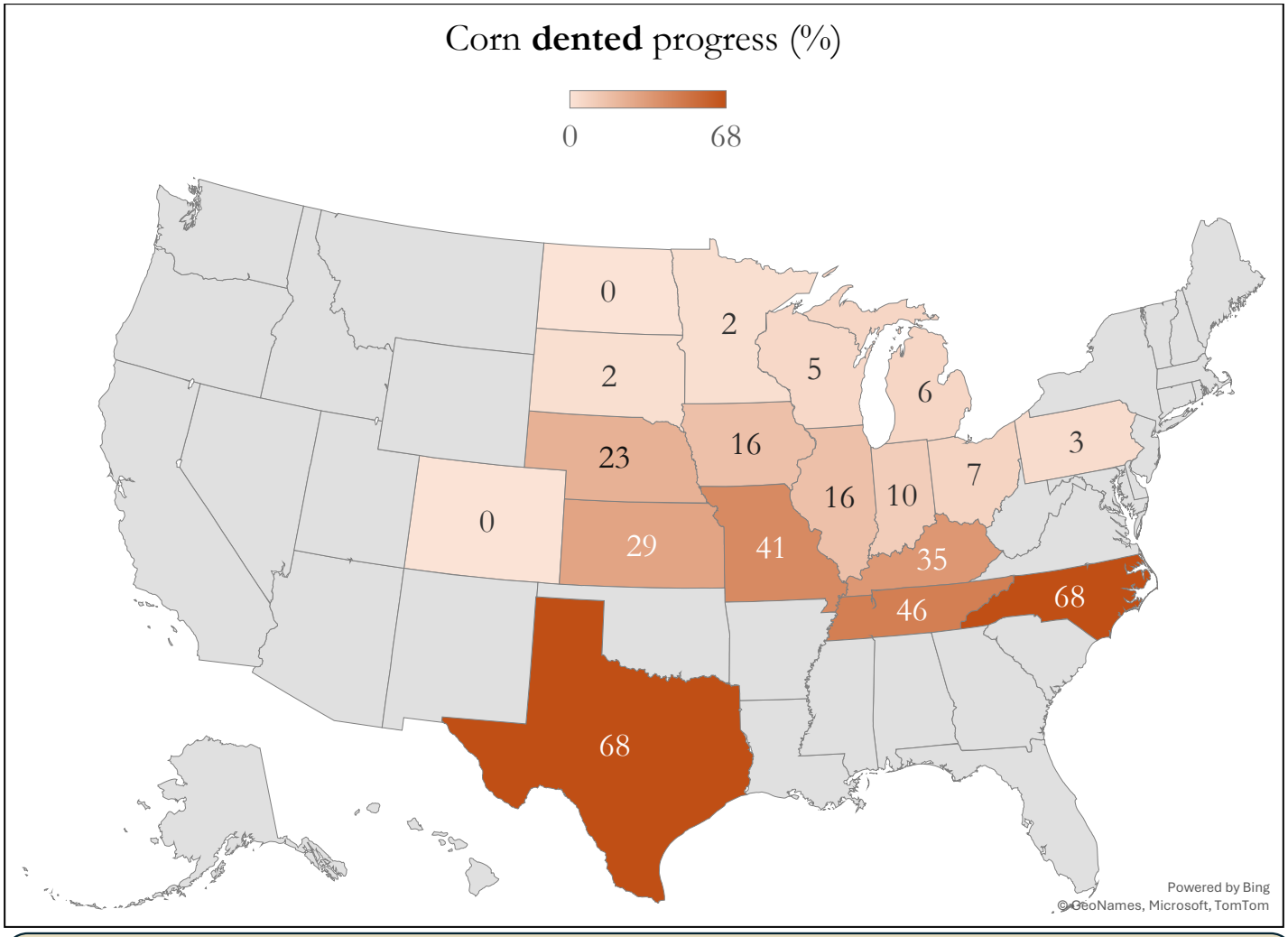

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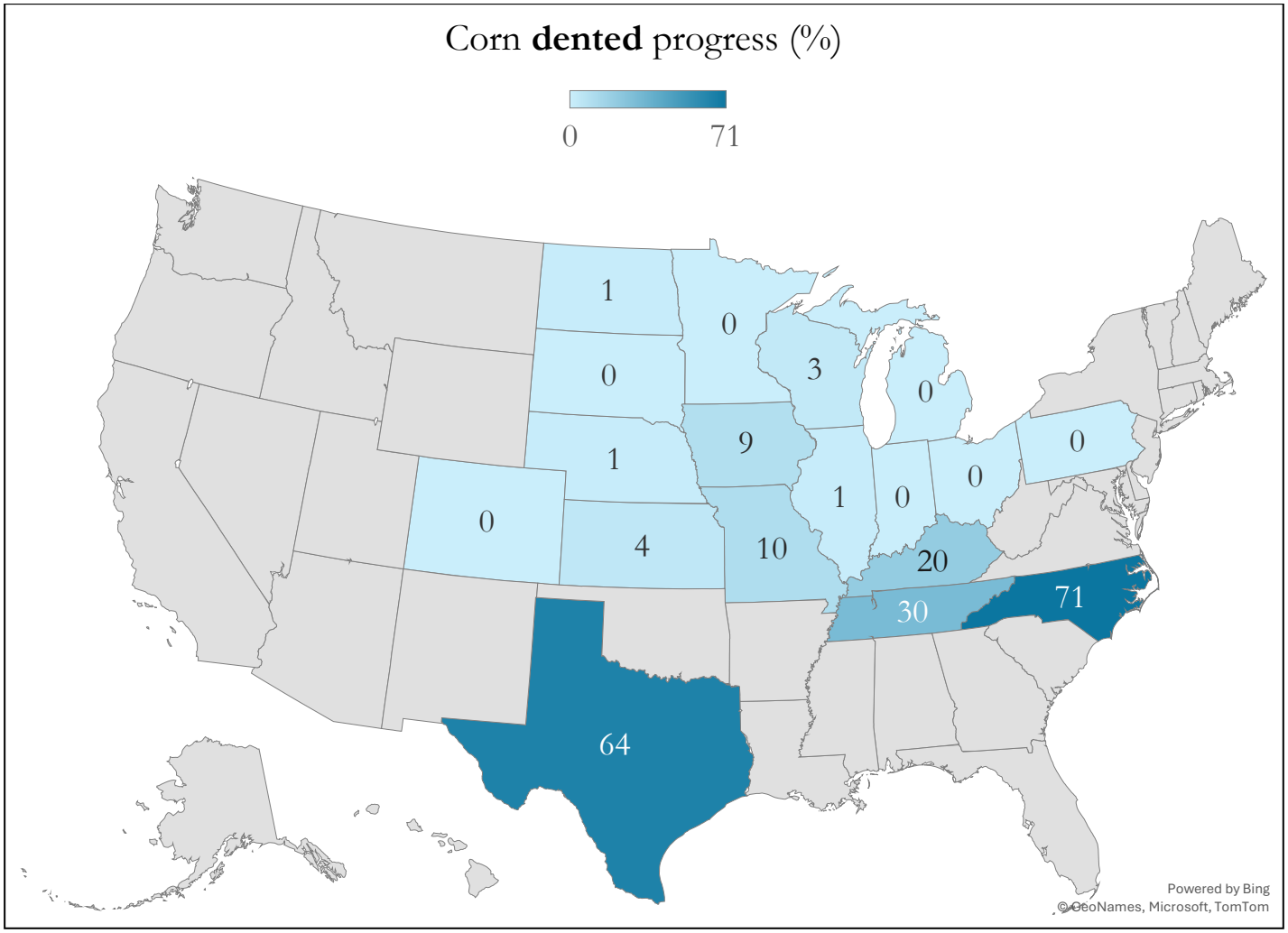

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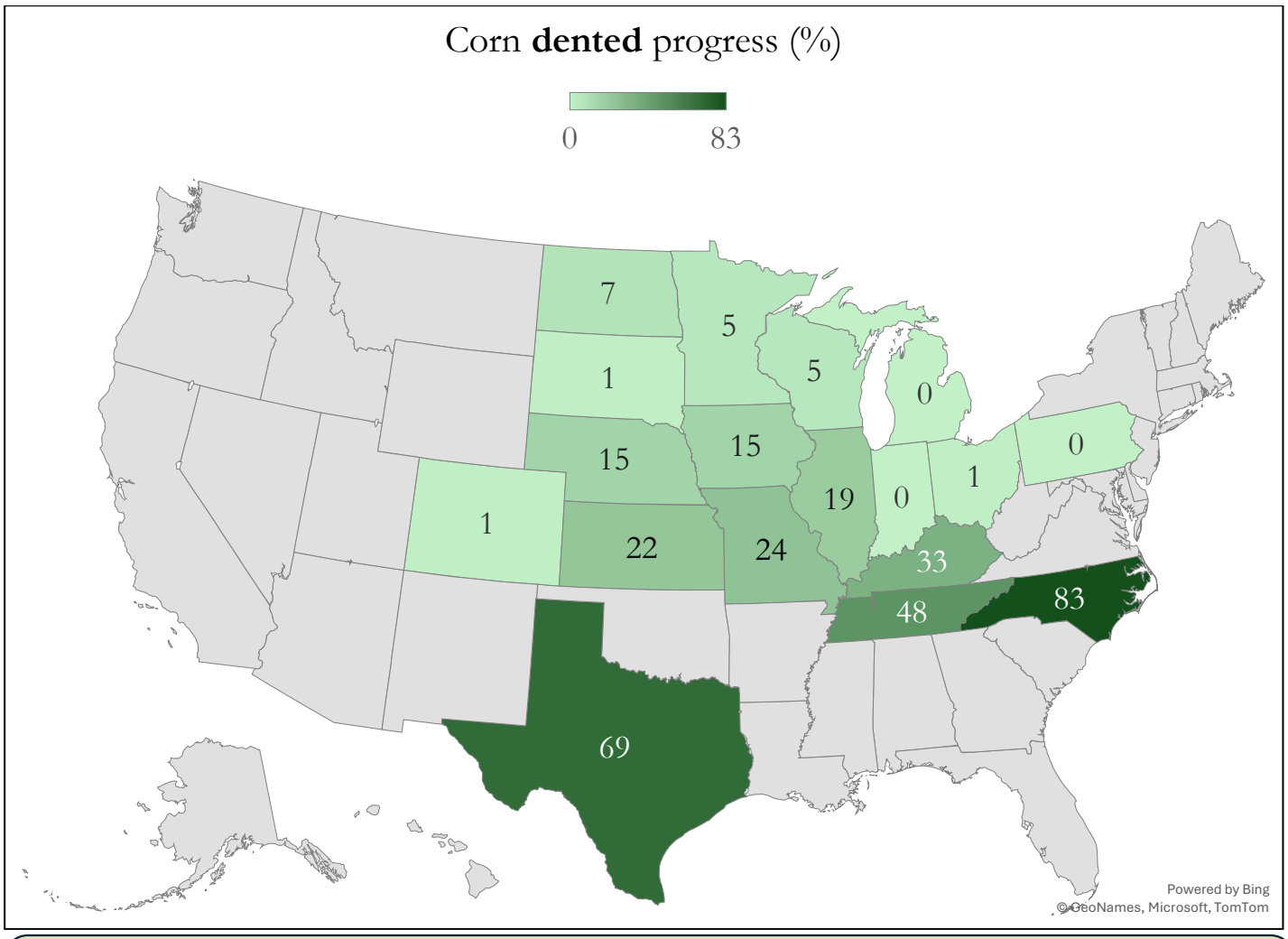

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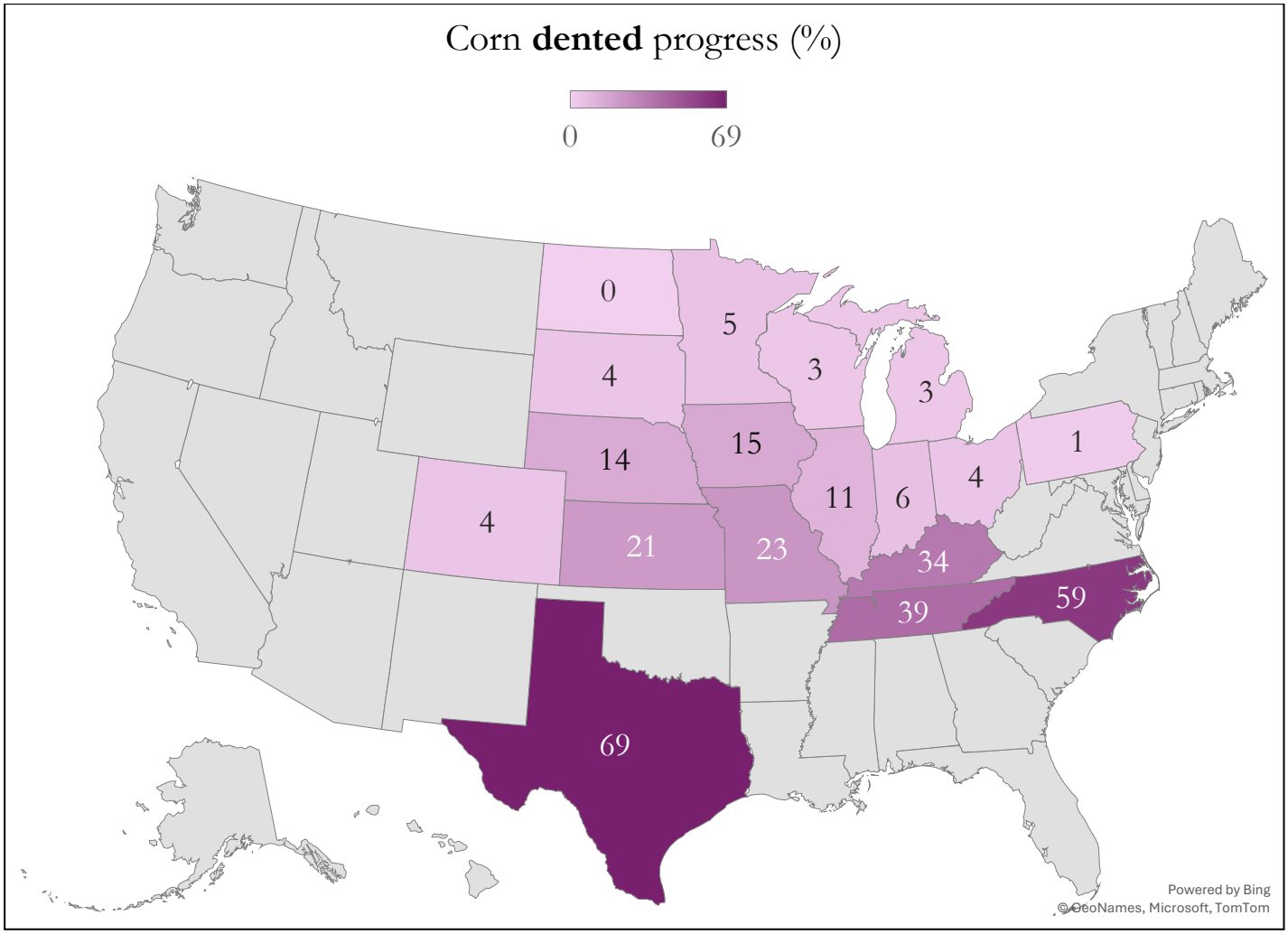

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