Winter Storm Fern: Power Outage Impacts, Restoration Performance, and Grid Resilience Lessons for Utilities and Regulators

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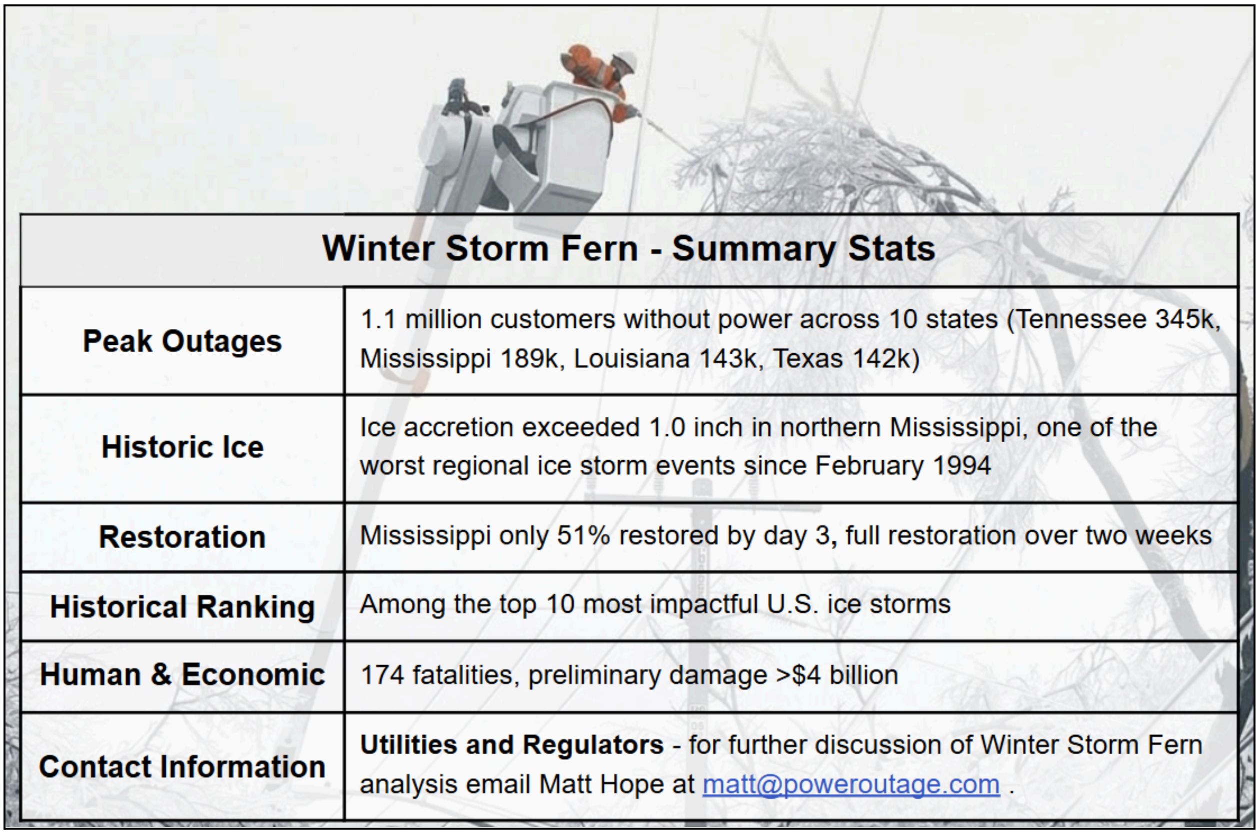


Winter Storm Fern - Summary Stats	
Peak Outages	1.1 million customers without power across 10 states (Tennessee 345k, Mississippi 189k, Louisiana 143k, Texas 142k)
Historic Ice	Ice accretion exceeded 1.0 inch in northern Mississippi, one of the worst regional ice storm events since February 1994
Restoration	Mississippi only 51% restored by day 3, full restoration over two weeks
Historical Ranking	Among the top 10 most impactful U.S. ice storms
Human & Economic	174 fatalities, preliminary damage >$4 billion
Contact Information	**Utilities and Regulators** - for further discussion of Winter Storm Fern analysis email Matt Hope at matt@poweroutage.com .

Key Insights for Electric Utilities and Regulators

- Restoration timelines were primarily driven by hazard severity and infrastructure damage, not deficiencies in utility response.
- Extreme ice loading events require infrastructure rebuilding, extending restoration timelines.
- Data-driven resilience planning is increasingly critical, including extreme ice scenario planning, targeted vegetation management, and infrastructure hardening in high-risk corridors.
- Independent outage analytics and standardized geospatial frameworks improve cross-utility benchmarking and can help regulators evaluate restoration performance objectively.
- Real-time geospatially standardized outage information can help utilities improve restoration time and reduce impact for major events.

Winter Storm Fern (January 2026) was a record-breaking winter storm of the 2025–2026 season, producing widespread ice and heavy snow across much of the central and eastern United States. At peak, more than **2 million people** were without power across 10 states, with restoration efforts extending beyond two weeks in the hardest-hit areas due to extensive ice accretion and infrastructure damage. Preliminary damage estimates exceed **$4 billion**, reflecting impacts to electric transmission and distribution systems, transportation networks, businesses, and residential property. Tragically, **174 fatalities** were attributed to the storm, making it one of the deadliest winter storms in modern U.S. history - second only to Winter Storm Uri (2021).

Winter Storm Fern's most impactful hazard to electric grid reliability was widespread freezing rain and significant ice accretion. Power outages extended across more than **10 states** from Texas to Virginia, reflecting the broad geographic footprint of the event. At peak, approximately 1.1 million customers were without power, with the most severe impacts concentrated in areas where ice accretion exceeded 1.0 inch, particularly across northern **Mississippi**. In several of the hardest-hit states — including Mississippi — ice loading of this magnitude had not been observed since the February 1994 ice storm, underscoring the historic nature of the event. Based on outage magnitude, geographic extent, and ice accretion intensity, Fern likely ranks among the **top 10 most impactful U.S. ice storms** in the modern electric-grid record in terms of power system disruption and widespread infrastructure impacts.

Power information compiled by PowerOutage.com in Figure 1 shows the power outages at the peak synchronous outages, which exceed 1 million customers. These power outages represent unique electric meter outages for the electric distribution system. This outage data is sourced from electric utility **outage management systems** and is processed and quality-controlled in real-time. In order to make the information most useful to support real-time emergency management decisions, the data is transformed to county-level outputs. The **greatest storm impacts** were seen where ice accretion was greatest from easternmost Texas, northern Louisiana, and extending northeast through Mississippi into Tennessee and Kentucky. Outages in southeastern Alabama were due to winds from thunderstorms. A second ice accretion zone east of the Appalachian Mountains was present in northeastmost Georgia and extending into South and North Carolina.

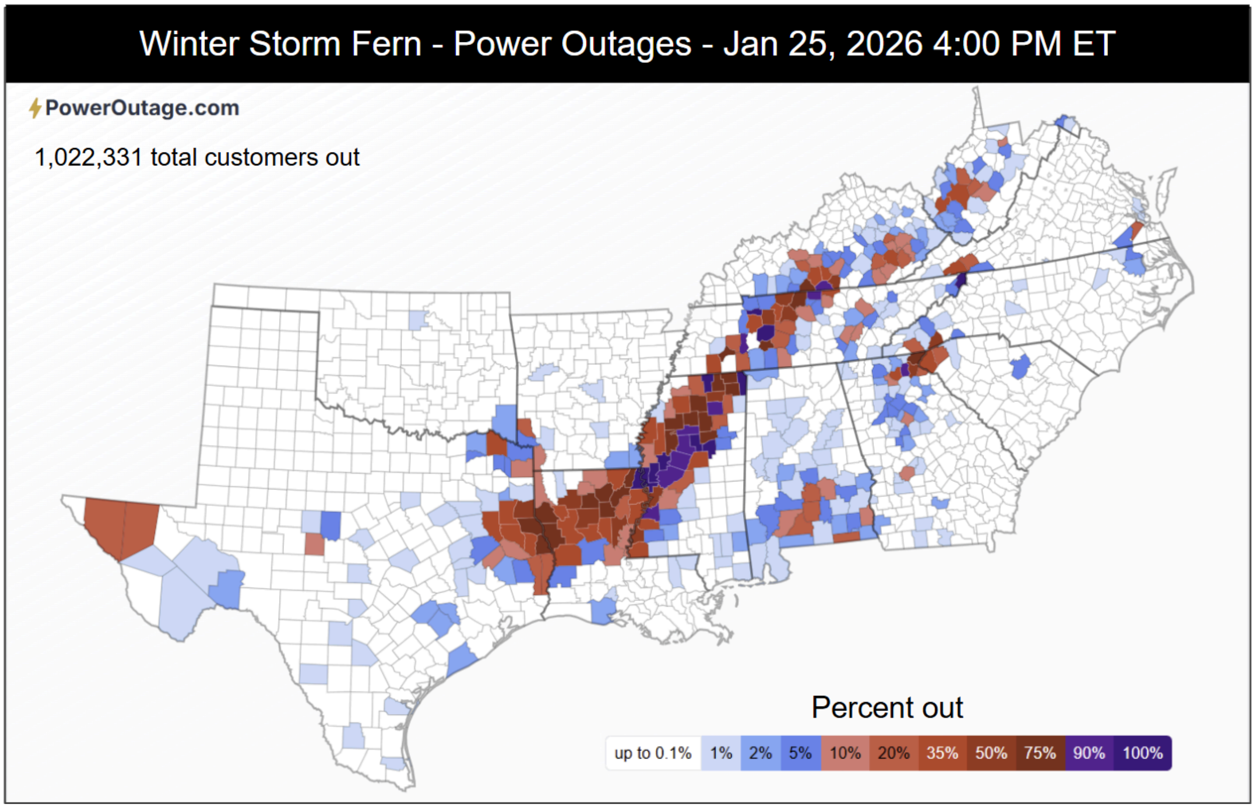
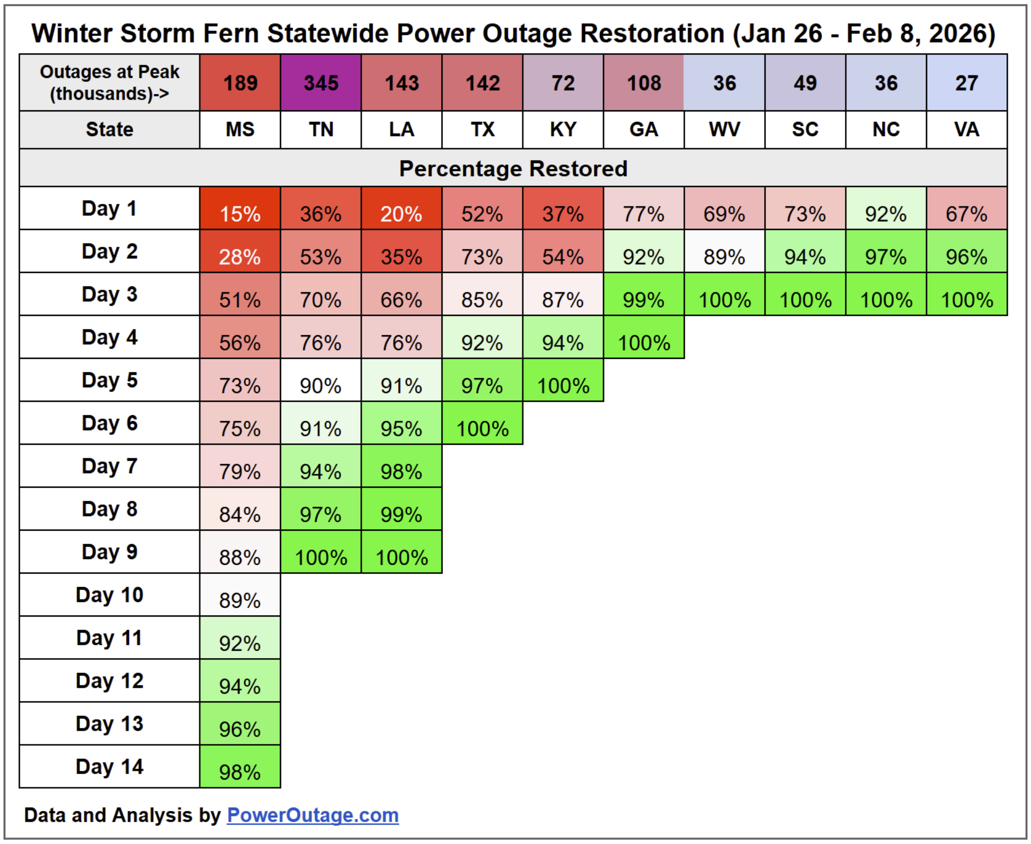


Figure 1. Peak synchronous power outages during Winter Storm Fern on January 25, 2026 at 4:00 PM ET. Heatmap shows county-aggregated outages by percent of customers without power. Utilities and supporting organizations can access this product at no cost by reaching out to dashboards@poweroutage.com .

Winter Storm Fern produced widespread, multi-state grid disruption across the central and eastern United States, with peak outages exceeding **1.1 million customers** across the ten hardest-hit states. Tennessee (345,000) and Mississippi (189,000) experienced the highest peak impacts, followed by Louisiana (143,000) and Texas (142,000) - Table 1. In contrast, eastern states such as West Virginia (36,000), North Carolina (36,000), and Virginia (27,000) saw smaller but still significant peaks. Restoration performance diverged sharply by region, reflecting differences in damage severity, terrain, and infrastructure exposure. By **day 3**, South Carolina, North Carolina, Virginia, West Virginia, and Georgia had restored 99–100% of customers, demonstrating relatively rapid recovery.

The most **prolonged restoration** occurred in Louisiana, Mississippi, and Tennessee, particularly Mississippi, where widespread ice accretion exceeding one inch resulted in extensive tree and line damage. **Mississippi restored only 51% by day 3** and required nearly two weeks to reach 98% restoration, illustrating a long “tail” typical of severe ice storms with high vegetation and structural damage. Tennessee and Louisiana showed steady restoration rates (Table 1), reaching roughly 70% by day 3 and full restoration between days 9–10, while Texas and Kentucky recovered more quickly, surpassing 90% by day 4–5. The data in Table 1 highlight how restoration trajectories correlate strongly with hazard type and infrastructure exposure: ice-dominated events produce slower, more labor-intensive rebuild phases versus a faster, logistics-driven recovery. Collectively, these restoration curves place Winter Storm Fern among the more consequential modern ice events in terms of both peak outage magnitude and duration of power restoration and recovery.



Winter Storm Fern Statewide Power Outage Restoration (Jan 26 - Feb 8, 2026)

Outages at Peak (thousands)->	189	345	143	142	72	108	36	49	36	27
State	**MS**	**TN**	**LA**	**TX**	**KY**	**GA**	**WV**	**SC**	**NC**	**VA**
Percentage Restored										
Day 1	15%	36%	20%	52%	37%	77%	69%	73%	92%	67%
Day 2	28%	53%	35%	73%	54%	92%	89%	94%	97%	96%
Day 3	51%	70%	66%	85%	87%	99%	100%	100%	100%	100%
Day 4	56%	76%	76%	92%	94%	100%				
Day 5	73%	90%	91%	97%	100%					
Day 6	75%	91%	95%	100%						
Day 7	79%	94%	98%							
Day 8	84%	97%	99%							
Day 9	88%	100%	100%							
Day 10	89%									
Day 11	92%									
Day 12	94%									
Day 13	96%									
Day 14	98%									

Data and Analysis by PowerOutage.com

Table 1. Winter Storm Fern statewide aggregated power restoration and peak outages.

Fern featured two significant **hazards** - snow and ice. Heavy snowfall extended from New Mexico to Maine, creating significant transportation impacts. Flight cancellations were extensive: more than 10,000 U.S. flights were canceled or postponed at the height of the storm as airports shuttered or reduced operations and many states issued travel bans or advisories. Snow impacts were geographically broad, affecting major interstates, urban centers, and rural communities across multiple regions. Emergency declarations were issued in 24 U.S. states to mobilize repair crews, guard units, and transportation resources.

Power grid impacts during Winter Storm Fern were driven primarily by **long-duration freezing rain** and significant ice accretion, which led to widespread ice loading on trees and equipment. Extended periods of freezing rain produced sustained ice loading on conductors, crossarms, and poles, increasing mechanical strain and causing both vegetation-related outages and direct infrastructure failures.

The greatest ice accretion occurred across northern Louisiana extending into Mississippi, where 30 counties averaged 0.75 inches of ice or greater (Figure 2). The highest observed accumulation was near **Oxford, Mississippi**, where approximately 1.10 inches of ice was reported. Ice loading of this magnitude substantially increases load on overhead distribution systems, particularly in heavily forested areas.

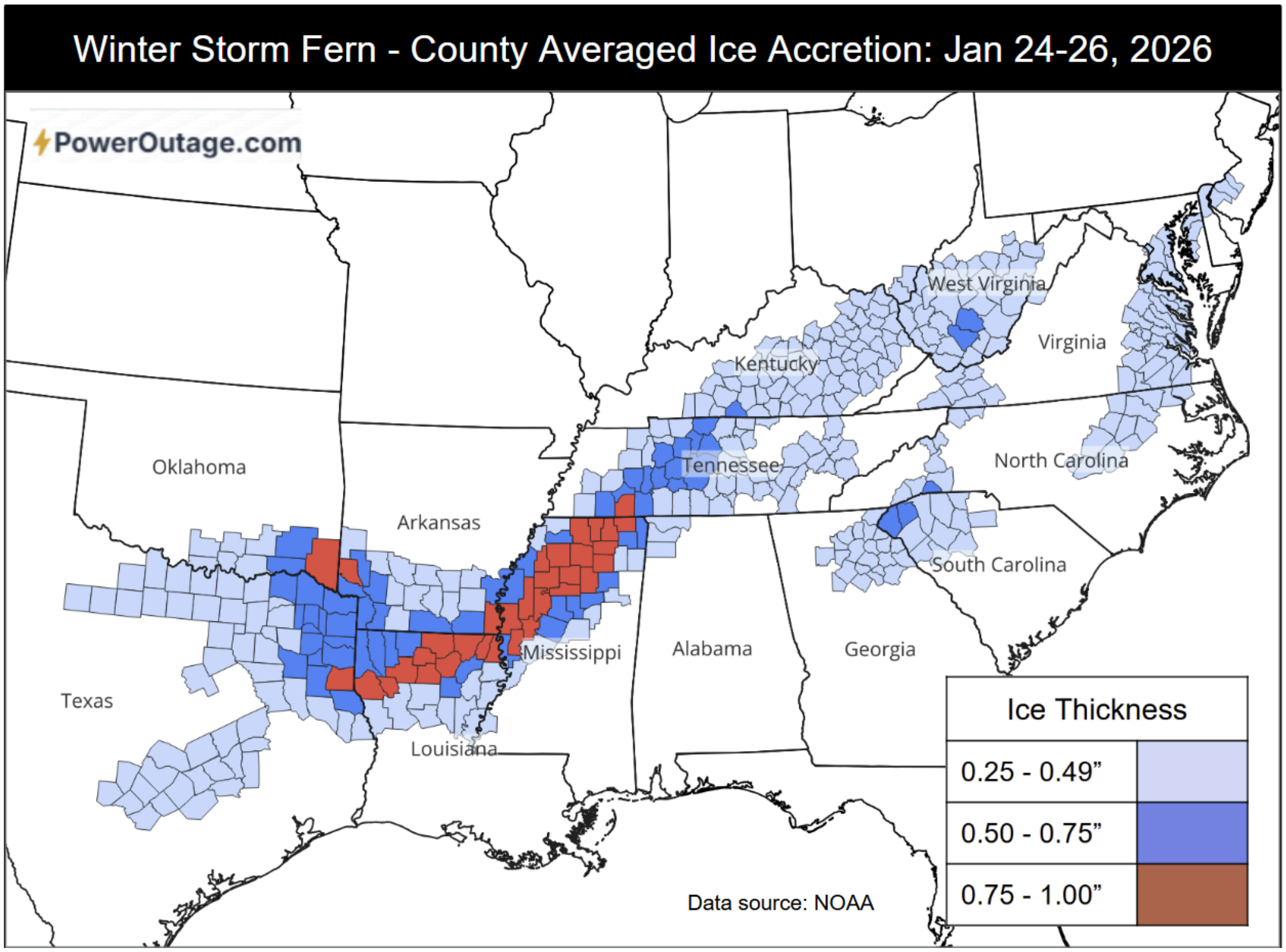


Figure 2. Observed ice thickness from January 24-26, 2026. Elevated flat-ice thickness, spatially averaged by county. Data source NOAA.

Farther east, cold air trapped along the eastern slopes of the Appalachians also produced freezing rain. However, accumulations were generally lower than predicted in these regions due to shorter freezing rain duration (from greater mixing with sleet and snow), and less overall precipitation. As a result, while outages did occur in these areas, the mechanical loading on infrastructure was less extreme compared to the Lower Mississippi Valley.

Electric Utility Impacts

Electric utilities located within the zone of greatest ice accretion experienced the most prolonged restoration timelines, particularly in areas where infrastructure damage required partial or full system **rebuilds**. In northern Mississippi, where peak ice accumulation exceeded one inch in several locations, restoration efforts extended beyond two weeks.

The utilities experiencing the highest estimated ice accretion totals (Figure 3) were:

- **Oxford Electric Utilities** – 1.10”
- **New Albany Light, Gas & Water** – 1.09”
- **Northeast Mississippi Power Association** – 1.09”
- **Tippah Electric Power Association** – 1.07”
- **City of Water Valley** – 1.05”

These systems operate predominantly overhead distribution networks in forested terrain, making them especially vulnerable to extreme ice loading. Ice accumulations exceeding one inch substantially increase load on conductors and vegetation, often surpassing standard design thresholds and resulting in broken spans, pole failures, crossarm damage, and widespread tree-related outages.

Where structural damage occurred, rather than simple conductor galloping or isolated limb failures, restoration required staged rebuilding, including pole replacement, span restringing, and vegetation clearing. This **extended outage durations** compared to regions that experienced less icing.

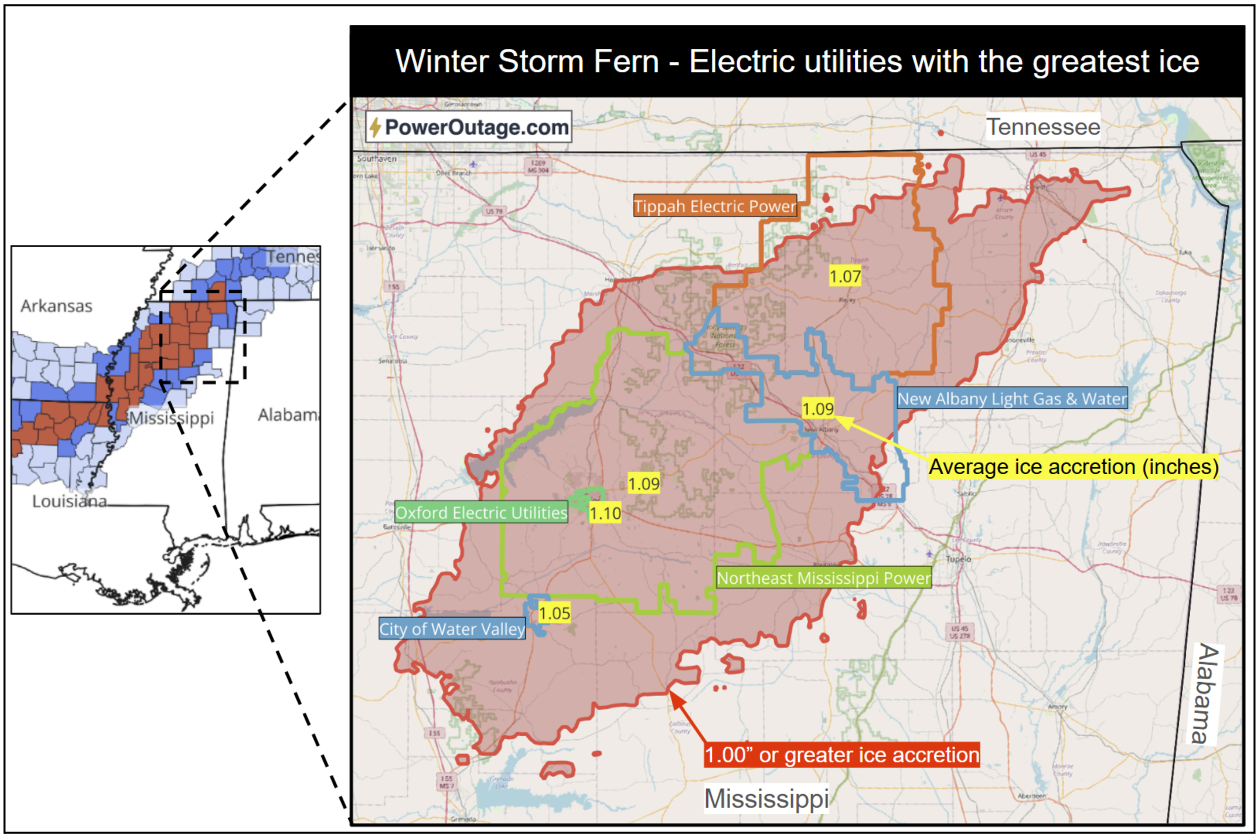


Figure 3. Northern Mississippi electric utilities with the greatest observed ice accretion. Ice accretion observations are area-average across service territory. Ice observations represent one-dimensional elevated flat ice - data source NOAA.

OutageIQ - Outage Analysis using a Standard Geospatial Framework

Power outage data is inherently **unstructured** and heterogeneous, with utilities reporting outage locations using a wide range of geographic representations, from precise point locations to irregular polygons that may represent circuits, neighborhoods, or entire towns. This **lack of standardization** creates significant challenges for processing, analysis, and interpretation.

The spatial areas used to represent outages can vary substantially across utilities in both scale and format. Some utilities report outages at very granular levels such as substations or circuit segments, while others provide aggregated outage areas that may span large portions of a county or multiple municipalities. As a result, the spatial **resolution** and **accuracy** of outage information **differ** widely from provider to provider.

This variability makes direct comparisons across utilities, states, and counties difficult, particularly when trying to evaluate outage severity, restoration performance, or customer impacts during major storm events. Without a **common spatial framework**, outage data must first be normalized or resampled into a consistent geographic indexing system before meaningful cross-utility analysis can occur. Standardized spatial frameworks, such as **hexagonal indexing** systems, provide a way to translate disparate outage geometries into comparable units, enabling more consistent regional and national analysis of grid disruptions and restoration outcomes.

An example of unstructured data is illustrated in Figure 4 (left panel), which shows the original reported outage geometries as they were collected from utility outage management systems, where service interruptions are represented as a **mixture** of point locations and irregular polygon shapes.

When fully processed and transformed to this hexagonal index system, outage information can be represented as values within each **hexagon grid cell** to make outage information human understandable and machine readable. An example of this type of output from Winter Storm Fern is shown on the right panel in Figure 4, which shows the resampling of reported customers without power into a common H3 hexagonal indexing system. This transformation creates a consistent spatial unit of analysis, allowing outage severity magnitude and restoration progress to be **compared objectively** across utilities and geographic regions. By normalizing outage information into a standardized framework, the approach supports smarter operational insights and more robust regional analytics, including storm impact mapping, restoration analysis, and **benchmarking** of outage severity.

The implications of this normalization extend well beyond data visualization. A consistent framework enables more transparent regulatory evaluation of **storm response**, improved benchmarking of resilience across utilities, and more precise identification of vulnerable areas. During active events, normalized outage data can also support emergency management decisions by highlighting where impacts are greatest relative to population and infrastructure. Ultimately, this approach improves situational awareness and accelerates response, which can directly translate to faster restoration, better resource allocation, and improved **public safety** during extreme events.

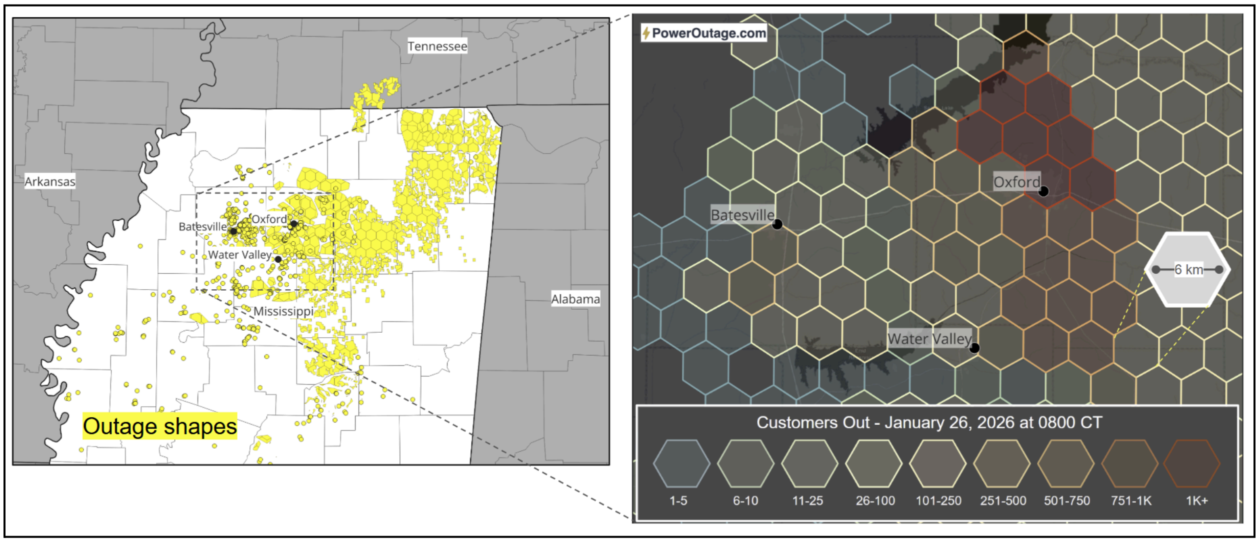


Figure 4. This is an example of the granular events-specific insights available through OutageIQ. Observed outage information on January 26, 2026 at 0800 CT showing the coverage of reported outage shapes (left), and the resampling of customers without power to a common H3 indexing system (right). Regulators and utilities who are interested in learning more about our current development of OutageIQ's post-event analysis capabilities can contact Matt Hope at matt@poweroutage.com.

Summary

Winter Storm Fern combined widespread snowfall with severe, long-duration freezing rain to produce the most significant US power outage event of the 2025-2026 winter season. The most significant outage impacts occurred across the Lower Mississippi Valley, where ice accretion exceeded one inch and caused extensive vegetation damage and structural failures across overhead distribution systems. In these hardest-hit areas, restoration required **infrastructure rebuilding**, which extended restoration timelines beyond two weeks. The magnitude, duration, and geographic footprint of outages place Fern among the most significant modern U.S. ice storms in terms of electric system disruption and recovery complexity.

From a regulatory perspective, Fern highlights the importance of evaluating reliability performance within the context of storm severity, hazard type, and infrastructure exposure. The **restoration curves** observed during Fern demonstrate that prolonged restoration timelines were primarily driven by infrastructure damage from extreme ice loading, rather than operational shortcomings.

This analysis provides an independent, **data-driven** perspective on storm response and recovery by combining real-time outage information, meteorological hazard data, and restoration performance metrics. By placing outage impacts within the context of storm severity and infrastructure vulnerability, this approach enables regulators and utilities to better understand system performance, **benchmark restoration** outcomes across regions, and identify opportunities to strengthen long-term grid resilience.

For further discussion of Winter Storm Fern analysis or to explore how OutageIQ can support your organization’s response, preparedness, and regulatory reporting, contact Matt Hope at matt@poweroutage.com .