



From Winter Storms to Better LANDFIRE Data

How Storms (and other Disturbances) show up in LANDFIRE

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To ensure our products are as current as possible, the LANDFIRE team continuously captures disturbance events from satellite imagery, federal and state programs, systems of record, and submissions from LANDFIRE users. These disturbance polygons are processed through LANDFIRE's machine learning models and annual update workflows, which feed downstream vegetation, fuels, and fire behavior layers that support decision-making across the country. Maintaining nationwide, current geospatial data at this scale is uncommon and difficult to achieve... *but LANDFIRE is doing it.*

WHAT HAPPENED: From January 23-27, 2026, a massive weather system struck North America bringing severe snow, freezing rain, and ice to more than 40 states, Canada, and northern Mexico. Unofficially known as [Winter Storm Fern](#), this event challenged the Southern U.S. with extremely cold temperatures that resulted in unprecedented ice deposition across middle Tennessee, northern Mississippi, and northwestern Alabama. Unaccustomed to this severe weather, nearly 2-million acres of oak, hickory, poplar and pine trees buckled under the weight of the ice. In response, nearly 250 Tennessee Division of Forestry

(TDF) personnel found themselves conducting “cut and chuck” operations across a wide swath of the state. They worked tirelessly to remove downed trees and dangerous debris that limited access and services for millions.

TDF response to the storm was dispersed across 16 counties, as well as nearby Mississippi and Alabama. Colin T. Stiles (below), a GIS specialist with the TDF,



Colin T. Stiles

quickly mobilized to provide GIS support using what he called “ad hoc mapping” to those workers on the ground.

But clearing roads and cleaning up debris was just the first step. Once the immediate response ended, another question emerged: How much of the landscape had changed?

“Cut and chuck” efforts in Wayne County, Tennessee





McNairy County, Tennessee

TURNING STORM DAMAGE INTO DATA:

Colin noted that TDF had well-established procedures for responding to wildfires but did not have the same ready-to-use data collection system for a severe weather event such as this ice storm. To that end, Colin quickly adapted, assembling maps and providing information as the response activities unfolded.

During the recovery phase, Colin began working with satellite-derived data called HiForm that shows changes in vegetation across impacted states. Originally developed by the U.S. Forest Service's Eastern Forest Environmental Threat Assessment Center, HiForm uses Google Earth Engine and 10-meter Sentinel-2 and 30-meter Landsat imagery with primary reliance on the Normalized Difference Vegetation Index (NDVI), to calculate vegetation change.

Colin and his colleagues are using the HiForm data to get a full picture of the vegetation change following Winter Storm Fern. This includes filtering and grouping the data into five damage classes, ranging

from little or no damage to severe damage. Of high priority to Colin and his team is sending this disturbance information to LANDFIRE.

Halloween may be all about ghosts, but your disturbance and treatment data shouldn't vanish from the record! If a prescribed fire, wildfire, fuel treatment, ice storm, or other event occurred between October 1, 2025, and September 30, 2026, submit it to LANDFIRE by October 31, 2026. Events received after October 31 will not be incorporated into LF 2026 vegetation or fuels products. Submit by the deadline to help ensure LF 2026 reflects conditions on the ground.

LOOKING BACK (AND FORWARD): As part of the data processing effort, Colin compared the damage with before-and-after HiForm imagery. In the hardest-hit areas, trees lay across roads and whole sections of forest were flattened.

"You can see all the ice everywhere," he said.

These comparisons helped demonstrate the storm's severity, but it also exposed limitations in the available data.

"I know this isn't going to be 100 percent accurate data because it's a weather event and it's an emergency response kind of situation," Colin said. "I'll take what we can get, as long as we understand what those data gaps and assumptions are."

Colin's team is working on a comprehensive estimate of the total forest loss and acres impacted by Winter Storm Fern. They plan to refine the highest-damage portions of the satellite-derived dataset and submit relevant areas to LANDFIRE by October 31, 2026. Colin's submission and others like it carry local information upstream to the LANDFIRE Production team.

STORM FERN ILLUSTRATES WHY LOCAL DISTURBANCE DATA MATTERS. Colin's data will help tell the story of what changed on the ground. The graphic at the bottom of the page shows how disturbance information moves from a local submission into LANDFIRE products.

PREPARING FOR THE NEXT STORM. TDF is currently pursuing the best methods for establishing repeatable workflows for managing their response to future weather events. During emergencies, field personnel need ready-to-use tools for collecting information. During recovery, analysts need dependable imagery, documented methods, and a consistent way to estimate landscape change.

Ideally, Colin wants the division to manage that full process internally. "We would own every step of it," he said. Full ownership of the process would provide greater autonomy over the data and metadata, support ongoing quality control, and ultimately improve the final products for Tennessee, but also for partner efforts such as LANDFIRE.



McNairy County, Tennessee

For LANDFIRE, the story behind every disturbance event submission is a real place and usually a much bigger story: a prescribed fire manager pulling off a successful burn, an unseasonable ice storm causing massive damage, a dedicated group of folks clearing trees from roads, and someone like Colin comparing before-and-after imagery to document and quantify what changed. And finally, a national program like LANDFIRE managing the disturbance inputs, improving the data and carrying local knowledge into vegetation and fuels products used across the country.

How Disturbance Events Become LANDFIRE Products

