NERC
NORTH AMERICAN ELECTRIC RELIABILITY CORPORATION

Vegetation-Related Transmission Outages

2023 Annual Report

May 8, 2024

RELIABILITY | RESILIENCE | SECURITY




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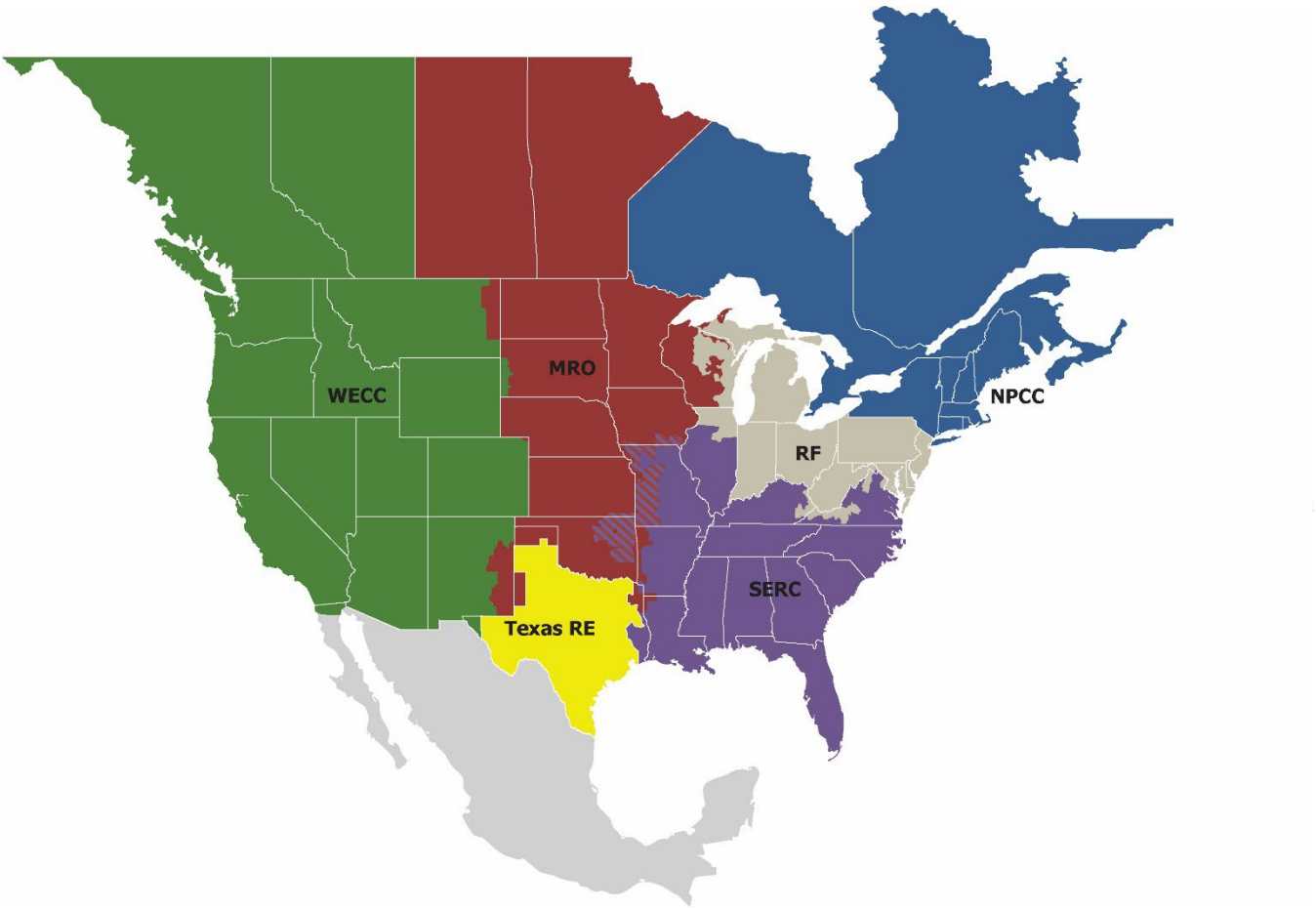
Preface

Electricity is a key component of the fabric of modern society and the Electric Reliability Organization (ERO) Enterprise serves to strengthen that fabric. The vision for the ERO Enterprise, which is comprised of NERC and the six Regional Entities, is a highly reliable, resilient, and secure North American bulk power system (BPS). Our mission is to assure the effective and efficient reduction of risks to the reliability and security of the grid.

Reliability | Resilience | Security
Because nearly 400 million citizens in North America are counting on us

The North American BPS is made up of six Regional Entities as shown on the map and in the corresponding table below. The multicolored area denotes overlap as some load-serving entities participate in one Regional Entity while associated Transmission Owners/Operators participate in another.



MRO	Midwest Reliability Organization
NPCC	Northeast Power Coordinating Council
RF	ReliabilityFirst
SERC	SERC Reliability Corporation
Texas RE	Texas Reliability Entity
WECC	WECC

Summary

This report summarizes the 2023 vegetation-related transmission outages that were reported to the ERO Enterprise.

As noted in the Compliance section of FAC-003, the applicable Transmission Owner and Generator Owner will submit a quarterly report to their Regional Entity, identifying all Sustained Outages of applicable lines operated within their Rating and all Rated Electrical Operating Conditions as determined by the applicable Transmission Owner or applicable Generator Owner to have been caused by vegetation, except as those excluded[1] in the Reliability Standard.

In 2023, the Regional Entities reported 18 vegetation-related outages due to vegetation contact from outside the right-of-way (ROW). 83 percent of the reported outages were caused by weather-related activities in the area. The registered entities have taken appropriate actions to remediate the issues and minimize reoccurrence.

[1] This requirement does not apply to circumstances that are beyond the control of an applicable Transmission Owner or applicable Generator Owner subject to this Reliability Standard, including natural disasters such as earthquakes, fires, tornados, hurricanes, landslides, wind shear, fresh gale, major storms as defined either by the applicable Transmission Owner or applicable Generator Owner or an applicable regulatory body, ice storms, and floods; human or animal activity such as logging, animal severing tree, vehicle contact with tree, or installation, removal, or digging of vegetation. Nothing in this footnote should be construed to limit the Transmission Owner's or applicable Generator Owner's right to exercise its full legal rights on the ROW.

Background

The purpose of the Transmission Vegetation Management Reliability Standard is to maintain a reliable electric transmission system by using a defense-in-depth strategy to manage vegetation located on transmission ROWs and minimize encroachments from vegetation located adjacent to the ROW, thus preventing the risk of those vegetation-related outages that could lead to Cascading. Additionally, the Reliability Standard requires the applicable registered entities to submit all Sustained Outages of applicable lines to their Regional Entities on a quarterly basis through Periodic Data Submittals.

Each of the reportable Sustained Outages is categorized in the Reliability Standard as one of the following:

- Category 1A — Grow-ins: Sustained Outages caused by vegetation growing into applicable lines, that are identified as an element of an Interconnection Reliability Operating Limit (IROL) or Major WECC Transfer Path, by vegetation inside and/or outside of the ROW;
- Category 1B — Grow-ins: Sustained Outages caused by vegetation growing into applicable lines, but are not identified as an element of an IROL or Major WECC Transfer Path, by vegetation inside and/or outside of the ROW;
- Category 2A — Fall-ins: Sustained Outages caused by vegetation falling into applicable lines that are identified as an element of an IROL or Major WECC Transfer Path, from within the ROW;
- Category 2B — Fall-ins: Sustained Outages caused by vegetation falling into applicable lines, but are not identified as an element of an IROL or Major WECC Transfer Path, from within the ROW;
- Category 3 — Fall-ins: Sustained Outages caused by vegetation falling into applicable lines from outside the ROW;
- Category 4A — Blowing together: Sustained Outages caused by vegetation and applicable lines that are identified as an element of an IROL or Major WECC Transfer Path, blowing together from within the ROW; and
- Category 4B — Blowing together: Sustained Outages caused by vegetation and applicable lines, but are not identified as an element of an IROL or Major WECC Transfer Path, blowing together from within the ROW.

Sustained Outages in 2023

Regional Entities reported 18 Sustained Outages from outside the ROW, a decrease from the 31 reported in 2022. The five-year average of reported Sustained Outages from outside the ROW has been approximately 29.

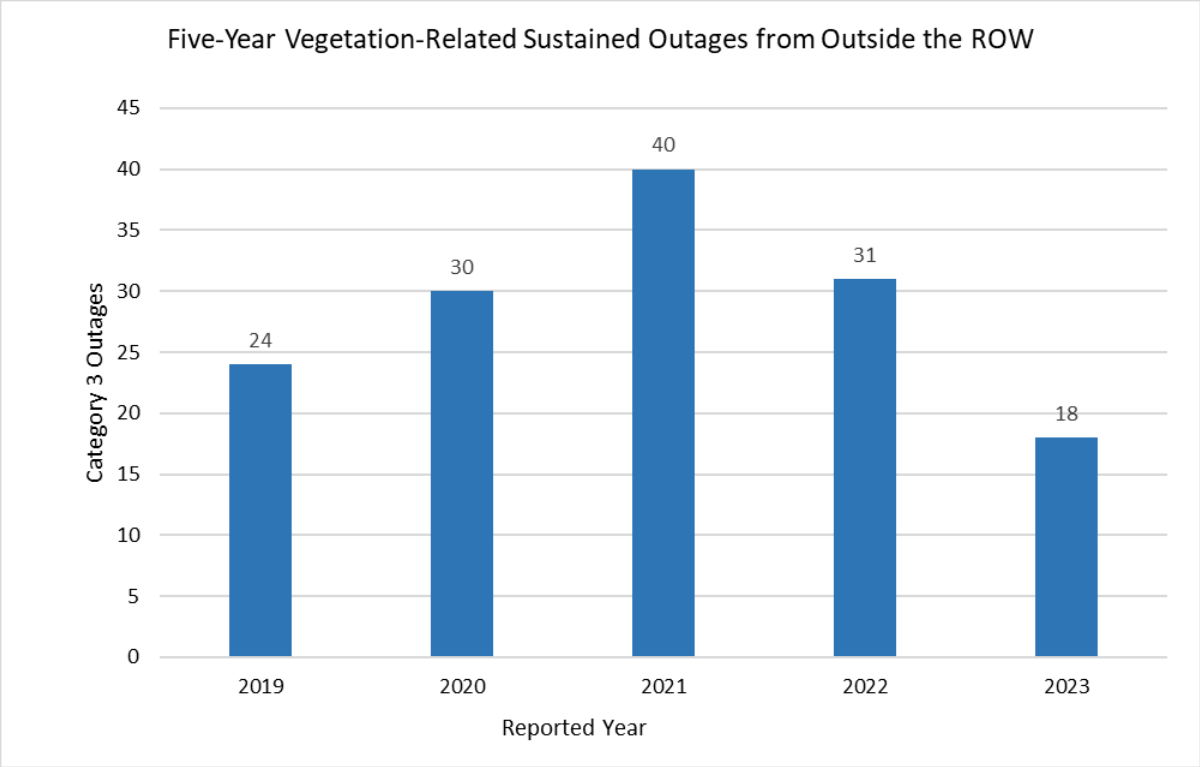


Figure 1: Vegetation-Related Sustained Outages From Outside the ROW (2019-2023)

Fifteen (83 percent) of the reported outages were due to weather-related events. There were no known weather-related outages for two outages.[2]

[2] The weather was unknown for one of the outages.

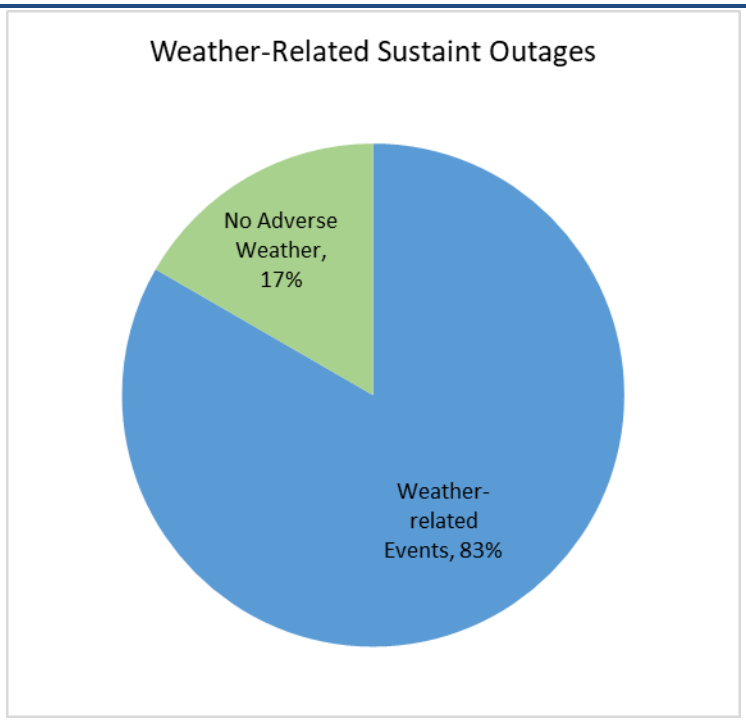


Figure 2: Percentage of Weather-Related Sustained Outages (2023)

The majority of the outages occurred on 230kV transmission lines, which are the most common voltage class in the United States.

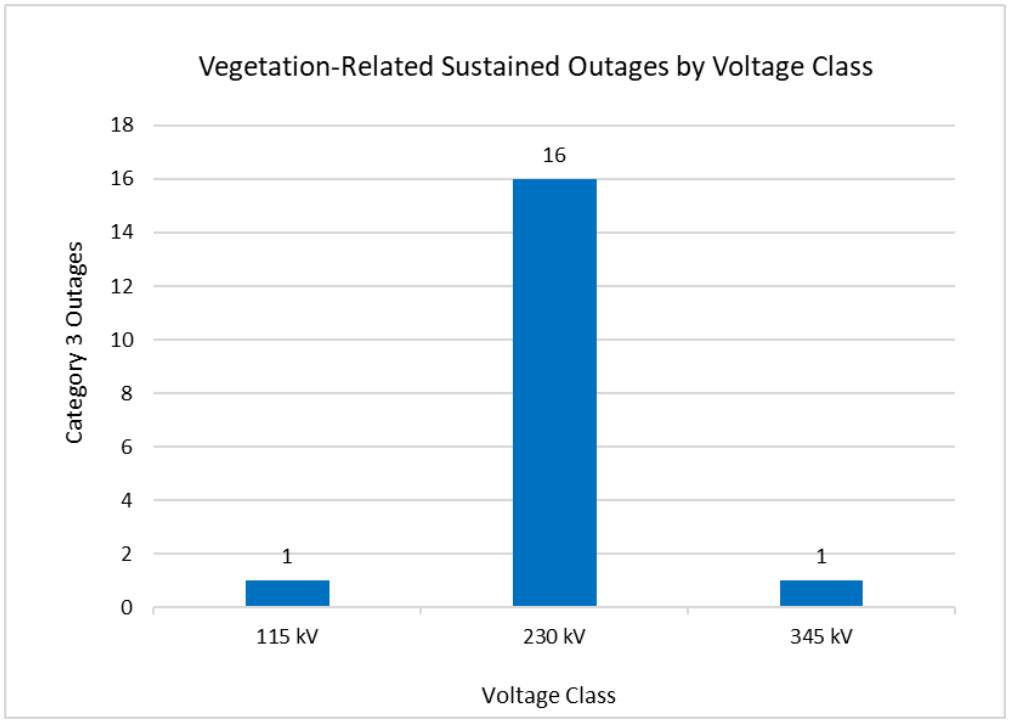


Figure 3: Vegetation-Related Sustained Outages By Voltage Class (2023)

Nearly 78 percent of the Category 3 outages reported in 2023 occurred in the Eastern Interconnection.

Climate anomalies and weather events including tree population, density, and tree types are amongst the contributing factors that could impact the number of vegetation-related sustained outages at different locality or interconnection. Figures 5 and 6 show the forested areas in the United States and some 2023 significant climate anomalies and events. While the data in this report does not directly relate to the graphical information in figured 5 and 6, they provide helpful visuals for the reasons behind the observed changes for the report.

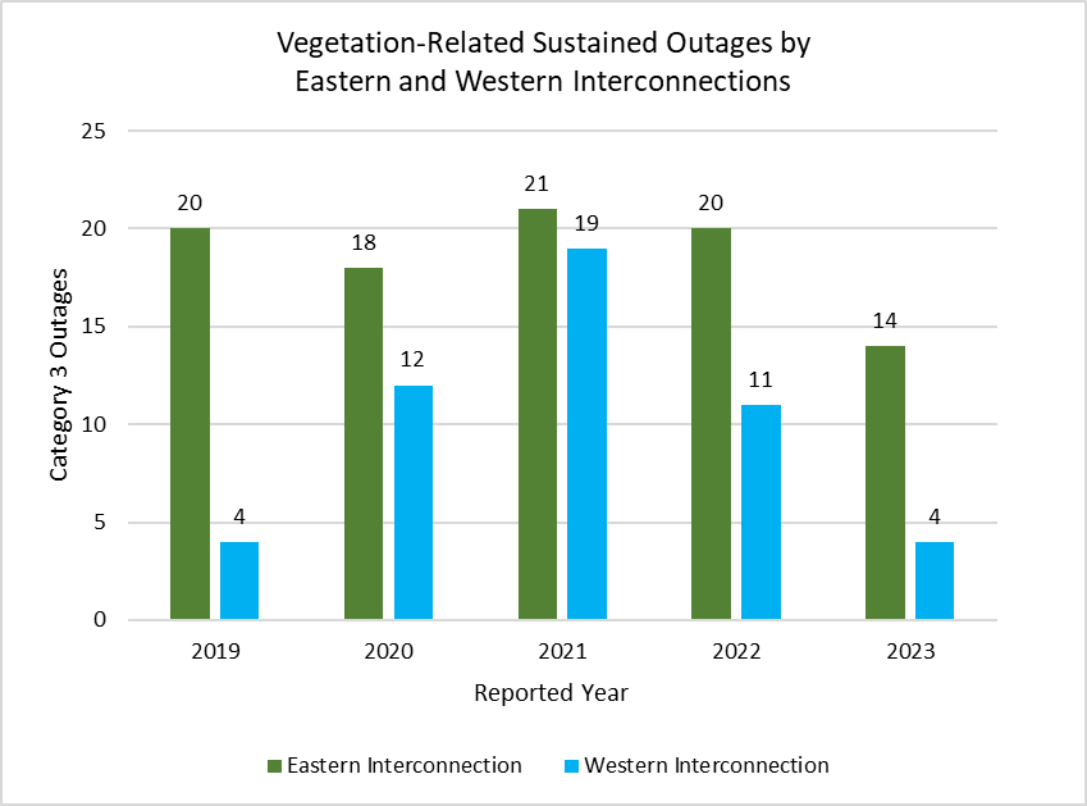


Figure 4: Vegetation-Related Sustained Outages by Eastern and Western Interconnections (2023)

Figure 5: Forest Atlas of the United States
Map source: https://apps.fs.usda.gov/forest-atlas/

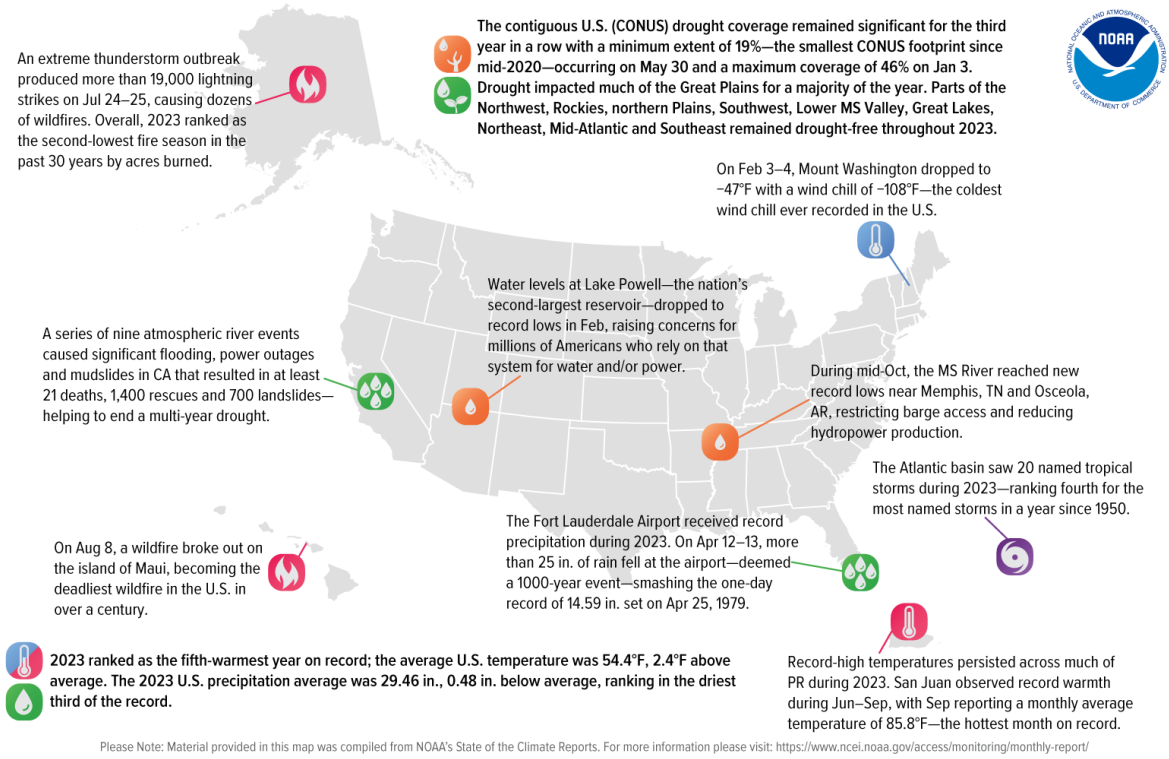


Figure 6: 2023 Significant Weather Events in the United States

Source: National Oceanic and Atmospheric Administration, National Centers for Environmental Information, National Climate Report – Annual 2023 https://www.ncei.noaa.gov/access/monitoring/monthly-report/national/202313

Conclusion

The ERO Enterprise will continue to monitor and review all reported vegetation-related outage issues and work with various internal and external groups to identify and mitigate risk. While ERO Enterprise continues to monitor vegetation related outages, FAC-003 is not an area of focus for the 2024 ERO Enterprise Compliance Monitoring and Enforcement Implementation Plan.[3]

[3] 2024 ERO Enterprise Compliance Monitoring and Enforcement Program Implementation Plan, available here: https://www.nerc.com/pa/comp/CAOneStopShop/ERO%20CMEP%20Implementation%20Plan%20v1.0%20-%202024.pdf