

NERC

NORTH AMERICAN ELECTRIC
RELIABILITY CORPORATION

Vegetation-Related Transmission Outages

2021 Annual Report

May 10, 2022

RELIABILITY | RESILIENCE | SECURITY



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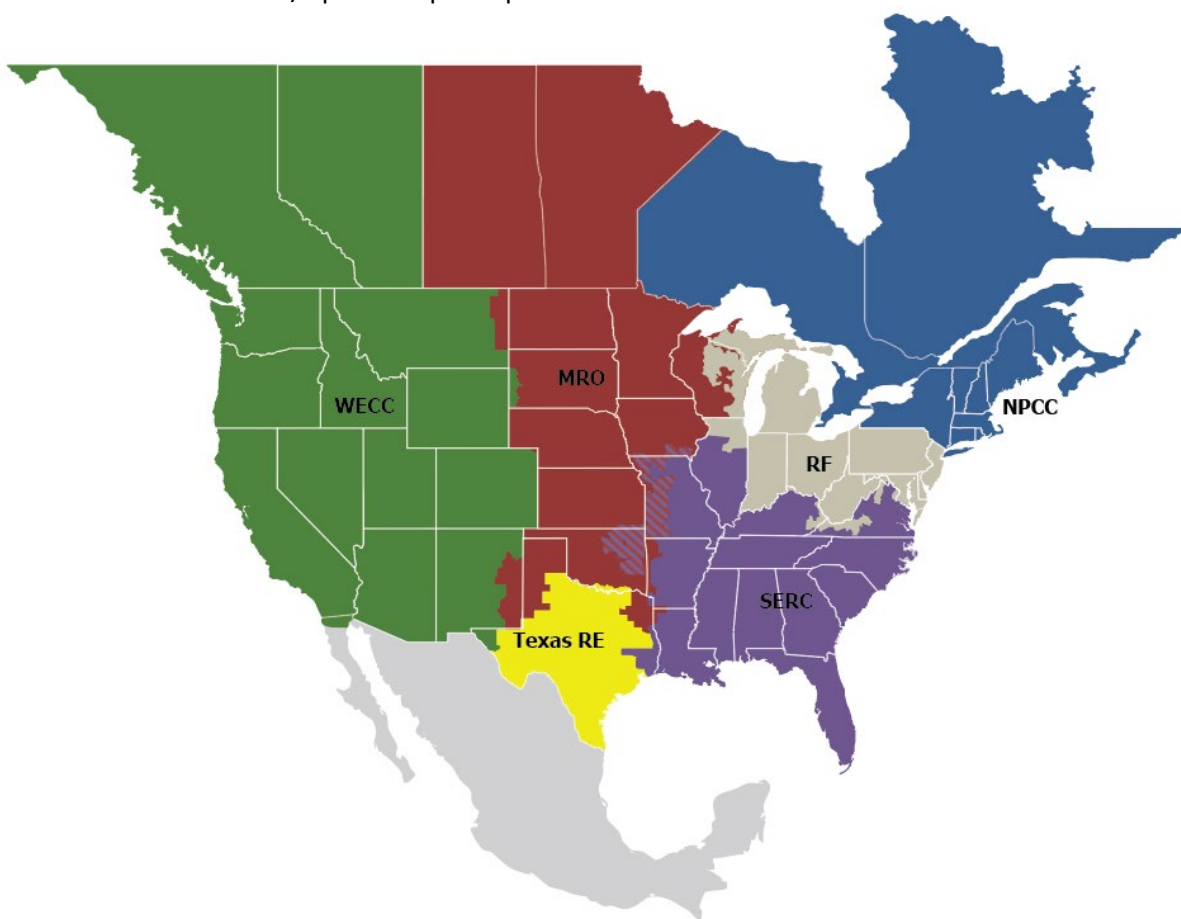
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Preface

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 the North American Electric Reliability Corporation (NERC) and the six Regional Entities, is a highly reliable 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 Entity boundaries as shown in the map and 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

Executive Summary

This report summarizes the vegetation-related transmission outages that have been reported to the ERO Enterprise in 2021.

Reliability Standard FAC-003-4 requires that applicable Transmission Owners and Generator Owners submit applicable Sustained Outages caused by vegetation to their Regional Entities on a quarterly basis.

In 2021, the Regional Entities reported 40 vegetation-related outages due to vegetation contact from outside the right-of-way (ROW). The majority of the 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

Three Full Notices of Penalty were filed in 2021 that involved vegetation encroachments or contact from inside the ROW.²

¹ For more information, refer to the quarterly vegetation-related transmission outages here:

<https://www.nerc.com/pa/comp/CE/Pages/CMEP%20and%20Vegetation%20Reports.aspx>

² For more information refer to the following:

https://www.nerc.com/pa/comp/CE/Enforcement%20Actions%20DL/Public_FinalFiled_NOP_NOC-2740.pdf

https://www.nerc.com/pa/comp/CE/Enforcement%20Actions%20DL/Public_FinalFiled_NOP_NOC-2704.pdf

https://www.nerc.com/pa/comp/CE/Enforcement%20Actions%20DL/Public_FinalFiled_NOP_NOC-2697.pdf

Introduction

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. FAC-003-4 requires applicable registered entities to manage vegetation located on transmission ROWs and minimize encroachments from vegetation located adjacent to the ROW. 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 are 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 2021

Regional Entities reported 40 sustained outages from outside the ROW, an increase from the 30 reported in 2020. Since 2017, the number of sustained outages from outside the ROW has gradually increased.

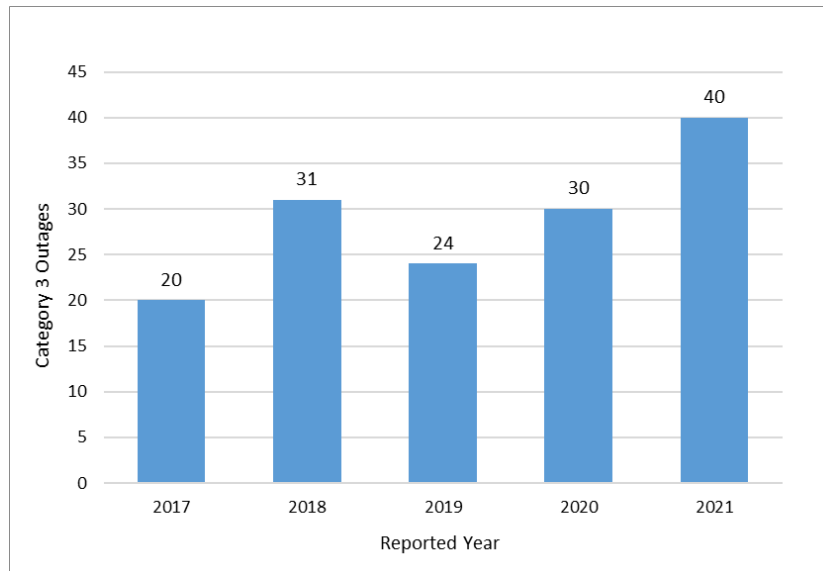


Figure 1: Five-year Vegetation-Related Sustained Outages from Outside the ROW

Of those 40 sustained outages from outside the ROW, 30 (75 percent) were due to weather-related events. There were no known weather-related issues for 10 (25 percent) of the reported outages.

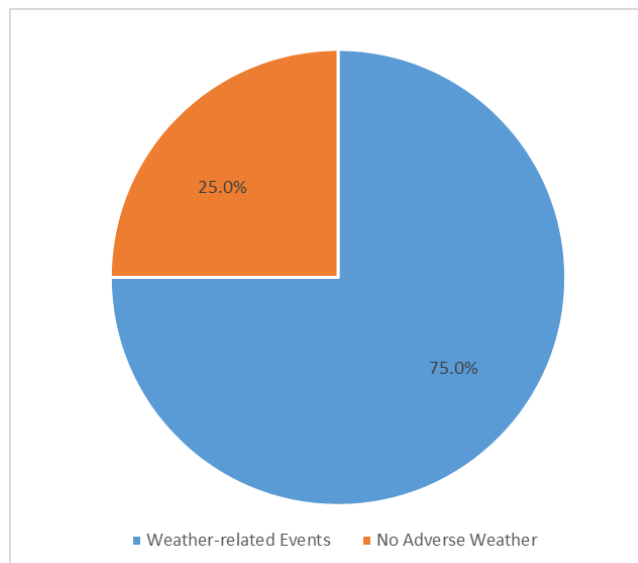


Figure 2: Percentage of Weather-Related Sustained Outages

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

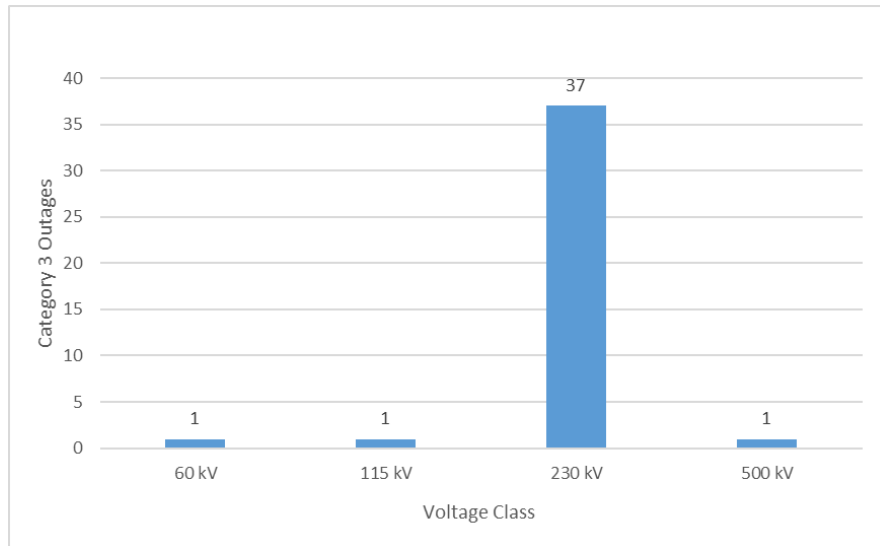


Figure 3: Vegetation-Related Sustained Outages by Voltage Class

Nearly 53 percent of the Category 3 outages reported in 2021 occurred in the Eastern Interconnection compared to 60 percent from 2020. As noted in Figure 5, climate anomalies and weather events in 2021 could have been contributing factors to some of these sustained outages.

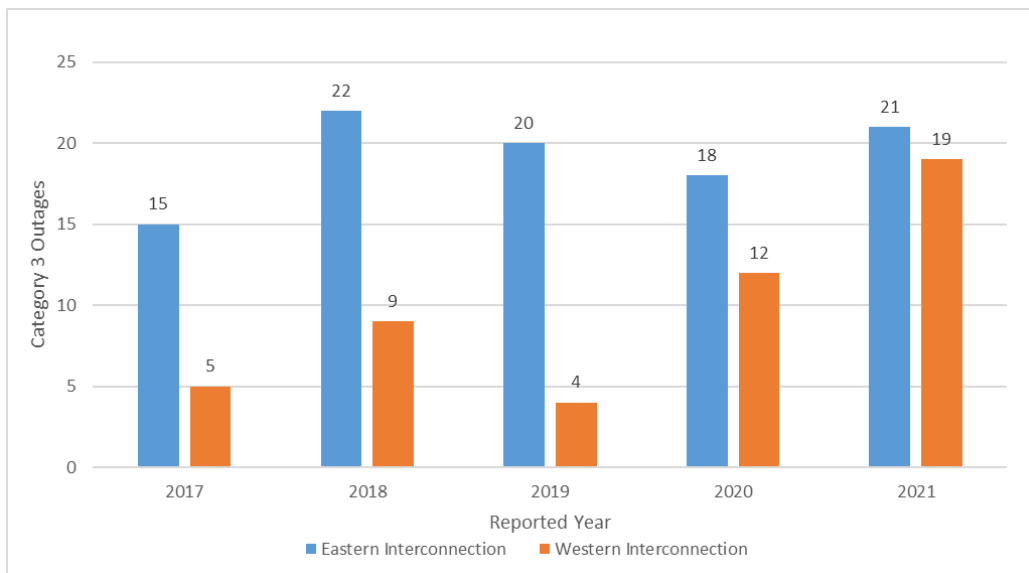
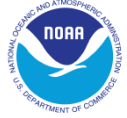


Figure 4: Five-Year Vegetation-Related Sustained Outages by Eastern and Western Interconnections

U.S. Selected Significant Climate Anomalies and Events for 2021



AK had its coolest year since 2012 and wettest year since 2015. The 2021 wildfire season was below average.

Fairbanks had its wettest year on record.



CONUS drought coverage remained fairly significant and steady throughout much of 2021 with a minimum extent of 43.4% occurring on May 25 and maximum coverage of 55.5% on Dec 7. Drought conditions remained intact for much of the western U.S. and northern to central High Plains throughout 2021 and blossomed along portions of the Lower MS Valley and the Carolinas near the end of the year.

The second-largest fire in CA history, the Dixie Fire, consumed nearly 964K acres in 2021. The overall acres burned for Western wildfire season was near average for the year. Poor air quality across the West and CONUS was a concern throughout much of the season.

Death Valley, CA, reached 130°F on Jul 9—the hottest temperature reported across the CONUS during 2021. This ties for the 3rd-warmest temperature on record for any month across the CONUS.

Up to 20 in. of rain fell Mar 8-9, causing flash flooding across portions of Maui.

Drought conditions across HI developed late in 2021, peaking at 56.8% by early Dec.

A cold-air outbreak across the central U.S., from Feb 10-19 brought frigid temperatures, snow and ice from the Plains to southern TX. It was the coldest event across the CONUS in more than 30 years and caused power outages for nearly 10M people.

Jun 27-30, all-time high temperature records were shattered across parts of the Pacific Northwest. Several locations in WA and OR tied or exceeded the warmest-known temperature values on record for each state.

Dec 10-11 severe weather produced 68 tornadoes across the Mid-MS Valley and Southeast. Two EF-4 tornadoes from the same storm were confirmed in AR, MO, TN and KY. One tornado was on the ground for nearly 166 miles—the longest-track Dec tornado on record. This was the deadliest Dec tornado outbreak on record with at least 90 fatalities reported.

Remnants of Hurricane Ida brought unprecedented rainfall, strong tornadoes and many fatalities to parts of the Northeast on Sep 1.

On Aug 29, Cat 4 Hurricane Ida made landfall in Louisiana and was the 5th-strongest landfalling hurricane to hit the CONUS, and the 2nd year in a row that a Cat 4 hurricane hit Louisiana. More than 1M residents, including all of New Orleans, were without power.



Moderate drought conditions across Puerto Rico remained under 20% for much of 2021. Drought peaked at 29% coverage on Nov 30.



2021 ranked 4th-warmest year on record; the average U.S. temperature was 54.5°F, 2.5°F above average. The 2021 U.S. precipitation average was 30.48 in., 0.54 in. above average, ranking in the middle third of the historical record.

Please Note: Material provided in this map was compiled from NOAA's State of the Climate Reports. For more information please visit: <http://www.ncdc.noaa.gov/sotc>

Figure 5: 2021 Significant Weather Events in the US³

FAC-003 remains an area of focus for the 2022 ERO Enterprise Compliance Monitoring and Enforcement Implementation Plan.⁴

³ National Oceanic and Atmospheric Administration, National Centers for Environmental Information, National Climate Report – Annual 2021, available here: <https://www.ncei.noaa.gov/access/monitoring/monthly-report/national/202113>

⁴ 2022 ERO Enterprise Compliance Monitoring and Enforcement Implementation Plan available here: <https://www.nerc.com/pa/comp/CAOneStopShop/ERO%20CMEP%20Implementation%20Plan%20v1.0%20-%202022.pdf>

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.