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Preface

The vision for the Electric Reliability Organization (ERO) Enterprise, which is comprised of the North American Electric Reliability Corporation (NERC) and the seven Regional Entities (REs), 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.

The North American BPS is divided into seven RE boundaries as shown in the map and corresponding table below. The multicolored area denotes overlap as some load-serving entities participate in one RE while associated Transmission Owners (TOs) or Transmission Operators (TOPs) participate in another.
**Executive Summary**

This report summarizes the vegetation-related transmission outages that have been reported to the ERO Enterprise in 2018.

Reliability Standard FAC-003-4 requires that applicable TOs and Generator Owners (GO) submit applicable Sustained Outages caused by vegetation to their REs on a quarterly basis.

The REs reported 31 vegetation-related outages due to vegetation contact from outside of the rights-of-way (ROWs).

Three additional sustained outages due to vegetation contact from inside the ROW were reported through periodic data submittals. These cases are currently under enforcement review.

The majority of the outages were caused by weather activities in the area. The registered entities have taken appropriate actions to remediate the issues and minimize reoccurrence.¹

¹ For more information, refer to Vegetation Management Reports at [https://www.nerc.com/pa/comp/CE/Pages/vegetation-management-reports.aspx](https://www.nerc.com/pa/comp/CE/Pages/vegetation-management-reports.aspx)
Introduction

The goal 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 REs 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 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 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.

The REs submit the aggregated report to NERC.
## Sustained Outages in 2018

Registered entities reported 31 Sustained Outages in 2018 that were from vegetation fall-ins from outside the ROW. These outages were largely due to various weather-related events.

Twenty-five of the outages were due to storms and two were the result of saturated soil. Four outages did not appear to be related to a known adverse weather event in the area. In three of the four instances, the tree was dead or had observed rot or decay. In one case, the tree fell due to human error when the contractor did not follow the correct tree falling procedures.

The three additional Category 1B outages did not appear to be weather-related. The three issues are still under review by applicable REs.

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**Figure 1.1: Five-Year Vegetation-Related Sustained Outages from Outside the ROW**

**Figure 1.2: Vegetation-Related Sustained Outages by Category from 2014 to 2018**
WECC and NPCC experienced a higher number of sustained outages in 2018 compared to 2017. The higher number could be due to the specific climate anomalies and events in 2018.

![Figure 1.3: Five-Year Vegetation-Related Sustained Outages from Outside the ROW by RE](image)

**Figure 1.3: Five-Year Vegetation-Related Sustained Outages from Outside the ROW by RE**
U.S. Selected Significant Climate Anomalies and Events for 2018

- Record-low sea ice plagued parts of western and northern AK early in the year, contributing to above-average temperatures. AK had its 2nd warmest year on record.
- On Dec 25, 23% of the contiguous U.S. was in drought. Since the start of 2018, drought improved across CA, the central Plains, the Southeast and much of the Northeast, while the Southwest and Northwest saw drought intensification.
- The Camp Fire destroyed over 15,000 structures and killed at least 88 people in CA in Nov. This was the deadliest and most destructive fire on record for CA and the deadliest wildfire in the U.S. since 1918.
- Heavy rainfall inundated parts of HI during Apr. A gauge at Waipio Garden, Kauai, HI, reported 49.69" of rain in 24-hours, setting a new U.S. record.
- The average U.S. temperature for 2018 was 53.5°F, 1.5°F above average and the 14th warmest on record. The annual U.S. precipitation was 34.63 inches, 4.69 inches above average, the 3rd wettest.

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

U.S. Selected Significant Climate Anomalies and Events for 2017

- The AK annual average temperature was 29.4°F, 3.4°F above average and the 7th warmest year on record. Much above-average temperatures were present across western and northern AK.
- The CONUS had its third warmest year on record. Every state was warmer than average. Precipitation was above-average for the year.
- The worst drought to impact the Northern Plains in decades rapidly developed in summer decimating crops across the region.
- A wet winter alleviated long-term drought in the West. Vegetation flourished, creating abundant wildlife fuel for the following dry season. CA experienced its most destructive fire season on record.
- Much of HI was warmer than average in 2017, especially the leeward coasts. Drought conditions expanded across the islands throughout the first half of 2017, peaking at 71% of the state in drought at the end of summer.

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 1.4: 2018 and 2017 Selected Significant Climate Anomalies and Events

2 https://www.ncdc.noaa.gov/sotc/national/201813
The majority of the outages happened on 230 kV transmission lines, which are the most common voltage class in the United States.

Figure 1.5: Vegetation-Related Sustained Outages by Voltage Class and Outage Category in 2018

FAC-003 remains on the 2019 ERO Enterprise Compliance Monitoring and Enforcement Implementation Plan because the ERO Enterprise has observed an increase in FAC-003-3 R2 violations resulting in vegetation contacts.³

Conclusion

FAC-003 remains one of the areas of focus for the ERO Enterprise’s monitoring activities in 2019. The ERO Enterprise will continue to review the root causes of vegetation issues and work with various internal and external groups to identify and mitigate risk.