

Danger Season 2023 microsite methodology

Updated May 2023

Description

The Danger Season 2023 web feature integrates daily National Weather Service alerts, population and social disadvantage data, and Climate Central’s Climate Shift Index (CSI) into maps and a webpage (<https://dangerseason.ucsusa.org/>). Our intent is to provide the public with up-to-date information on how climate change has turned the months between May and October into “Danger Season”—a period when extreme weather events in the United States and its territories have not only become more common and damaging, but also are more likely to overlap.

In addition to maps showing counties currently under extreme weather alerts, we provide four key indicators that are updated daily:

1. Total number of people facing alerts
2. Percent of disadvantaged people facing alerts since the start of Danger Season
3. Percent of people who have faced at least one alert since the start of Danger Season
4. Percentage of extreme heat alerts attributable to climate change since the start of Danger Season

Our maps and alerts data cover the contiguous United States, as well as Alaska, Hawaii, Puerto Rico, and the United States Virgin Islands. CSI data for Alaska, Hawaii, Puerto Rico, and the United States Virgin Islands were not available at the time we developed this product and are thus results based on CSI data not included here.

Data & Data Pre-processing

We pre-processed multiple datasets and aggregate all data to counties and *municipios* (the county equivalent in Puerto Rico). After doing this, we developed four Danger Season indicators.

National Weather Service (NWS) Alerts

The NWS provides current alerts as polygons in shapefile format (NWS 2023). Every day at 4:30AM Eastern Time, we download and process this shapefile to extract the following alerts based on the attribute table’s PHENOM data column, which we refer to as “Danger Season alerts”:

- CF (Coastal Flood)
- FA or FL (Flood)
- FF (Flash Flood)
- HU (Hurricane)
- SR (Storm)
- SS (Storm Surge)
- TI (Inland Tropical Storm)
- EH (Excessive Heat)
- HT (Heat)
- FW (Fire Weather)

NWS alerts are issued by Weather Forecasting Offices (WFOs) and often overlap multiple counties. To determine which alerts affect counties, we assign an alert to a county if that county's geographical center (i.e., centroid) is located within the polygon for that alert.

Population and social disadvantage data

We integrate county-level population data from the American Community Survey 5-Year Data for 2019 (US Census Bureau 2019). In addition, we integrate data from the Climate & Economic Justice Screening Tool, beta version (CEJST 2021). CEJST data contain a binary variable indicating a Census Tract's designation as a disadvantaged or non-disadvantaged community based on scores in "categories of burdens" comprised of multiple indicators covering climate change, energy burden, health, housing, pollution, transportation, water/wastewater, and workforce development. CEJST data include the contiguous United States (CONUS) as well as Alaska, Hawaii, Puerto Rico and the United States Virgin Islands.

Climate Central's Climate Shift Index (CSI)

We query Climate Central's CSI Application Programming Interface (Climate Central n.d.) process to obtain, daily, CSI values for daily maximum high temperatures between May 1, 2023 and the current day. We subset only CSI values indicating a moderate, strong, very strong, extreme, or exceptional influence of climate change in making temperatures more likely (i.e., CSI values ≥ 1). CSI data returned by this query are provided for NOAA climate divisions (NOAA 2023) covering CONUS and do not include Alaska, Hawaii, Puerto Rico or the United States Virgin Islands. We assign the CSI value to each county based on the climate division in which the county's geographical center is located.

Calculation of Danger Season indicators

Total number of people facing alerts

To estimate the total number of people in the United States currently facing NWS alerts, we subset all counties with current alerts and sum the total population in each county.

Percent of disadvantaged people facing alerts since the start of Danger Season

We aggregated Census Tract-level CEJST data by subsetting Census Tracts identified as disadvantaged in counties with active alerts and summing the total 2019 population. We then calculate the percent that this population represents out of the total US population.

Percent of people who have faced at least one alert since the start of Danger Season

To estimate this indicator, we subset all counties in the US with a current NWS alert of any and a CSI value indicating a moderate, strong, very strong, extreme, or exceptional influence of climate change in making temperatures more likely (i.e., CSI values ≥ 1). We then calculate the percent that this number of counties represents out of all counties in CONUS.

Percentage of extreme heat alerts attributable to climate change since the start of Danger Season

To estimate this indicator, we subset all counties in CONUS with a current heat alert and a CSI value indicating a moderate, strong, very strong, extreme, or exceptional influence of climate change in making

temperatures more likely (i.e., CSI values ≥ 1). We then calculate the percent that this number of counties represents out of all counties in CONUS.

References

National Weather Service. 2023. National Weather Service Data Download in GIS Format: Current Weather Warnings. <https://tgftp.nws.noaa.gov/SL.us008001/DF.sha/DC.cap/DS.WWA/>

National Oceanographic & Atmospheric Administration.n.d. U.S. Climate Divisions. nClimDiv Dataset. <https://www.ncei.noaa.gov/access/monitoring/dyk/us-climate-divisions>

Climate Central. U.S. Climate Shift Index TM Map. <https://www.climatecentral.org/tools/climate-shift-index>

US Census Bureau. 2019. American Community Survey 5-Year Data (2017-2021). <https://www.census.gov/data/developers/data-sets/acs-5year.2019.html#list-tab-1036221584>

White House Council on Environmental Quality. 2022. Climate and Economic Justice Screening Tool beta version. <https://screeningtool.geoplatform.gov/en/previous-versions>