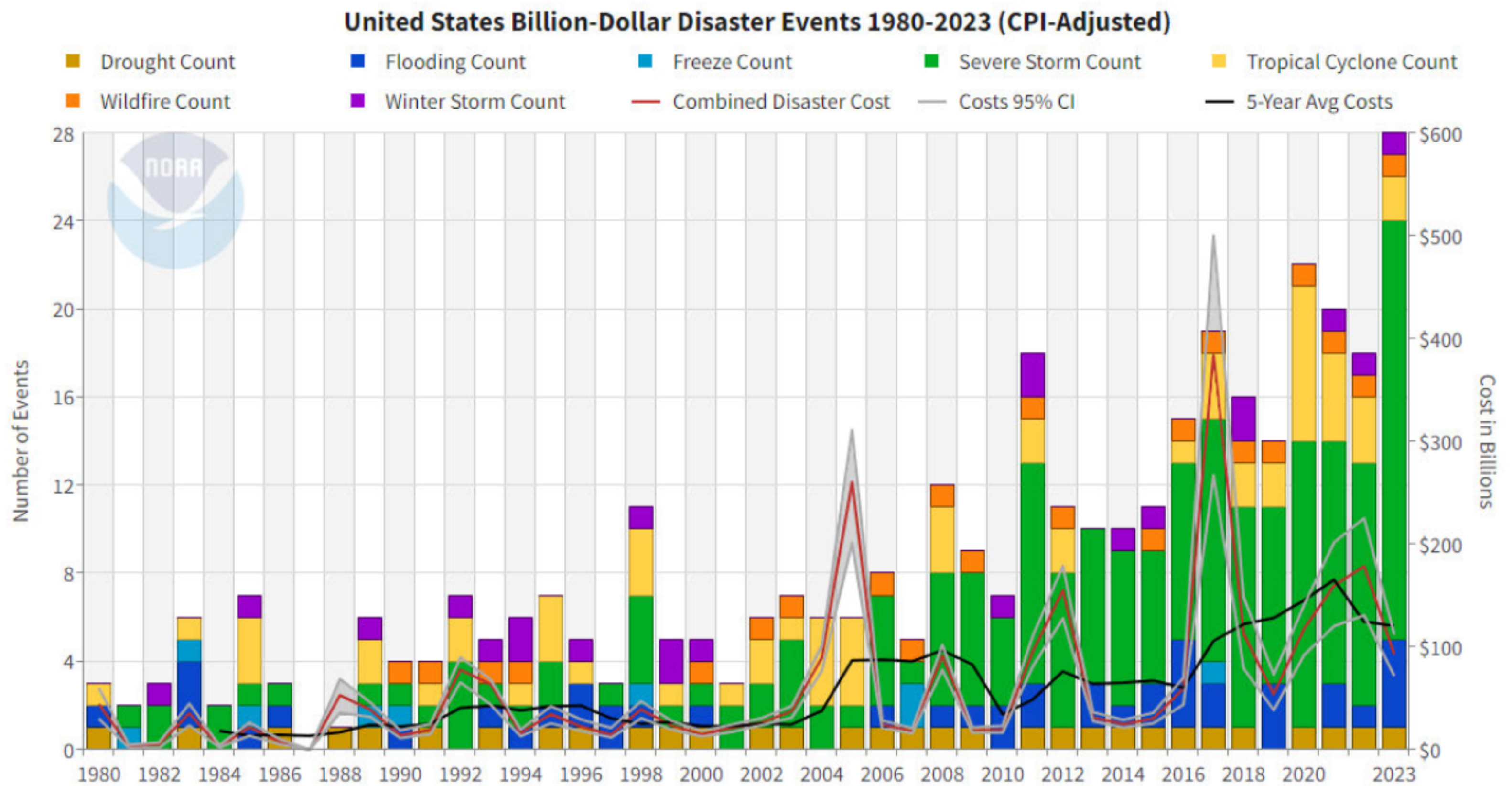
Time Series

Visualize the frequency and cost of billion-dollar weather and climate events using the
teractive time series.

All Disasters | Drought | Flooding | Freeze
Severe Storm | Tropical Cyclone | Wildfire | Winter Storm

United States | Cost | Update

CPI-Adjusted | Unadjusted



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Access Data

US Summary

During 2023, there were **28** separate billion-dollar weather and climate disaster events. These events include: nighteen severe storm events (tornado outbreaks, high wind, hailstorms), four flood events, two tropical cyclones, one wildfire event, one winter storm/cold wave and one drought/heat wave.

This historic number of events exceeds the prior annual record number of inflation-adjusted billion-dollar disaster events (i.e., 22 events in 2020).

The total cost from these 28 events **was $92.9 billion**. The total **cost of the last seven years** (2017-2023) **exceeds $1.0 trillion** while the costs for 376 events from 1980-2023 exceeds **$2.660 trillion** (inflation-adjusted to 2023 dollars).

Caution should be used in interpreting trends based on this graphic for a variety of reasons. For example, inflation has affected our ability to compare costs over time. To reflect this, the graphic also shows events with less than $1 billion in damage at the time of the event, but after adjusting for inflation (Consumer Price Index), now exceed $1 billion in damages.

The number and cost of disasters are increasing over time due to a combination of increased exposure (i.e., values at risk of possible loss), vulnerability (i.e., how much damage does the intensity (wind speed, flood depth) at a location cause) and that climate change is increasing the frequency of some types of extremes that lead to billion-dollar disasters (NCA 2018).

Milestones to Improve Data Analysis

In May 2012, NOAA's National Centers for Environmental Information -- then known as National Climatic Data Center (NCDC) -- hosted a workshop including academic, federal, and private sector experts to discuss best practices in evaluating disaster costs from extreme weather.

A research article "U.S. Billion-dollar Weather and Climate Disasters: Data Sources, Trends, Accuracy and Biases" (Smith and Katz, 2013) regarding the loss data we use, our methods and any potential bias was published in 2013. This research article found the net effect of all biases appears to be an underestimation of average loss. In particular, it is shown that the factor approach can result in an underestimation of average loss of roughly 10–15%. This bias was corrected during a reanalysis of the loss data to reflect new loss totals.

It is also known that the uncertainty of loss estimates differ by disaster event type reflecting the quality and completeness of the data sources used in our loss estimation. In 2018, three of the fourteen separate billion-dollar events (i.e., hurricanes Florence and Michael, and the Western drought) have higher potential uncertainty values around the loss estimates due to less coverage of insured assets and data latency. The remaining eleven events (i.e., the 8 severe storm events, 2 winter storms and California wildfires) have lower potential uncertainty surrounding their estimate due to more complete insurance coverage and data availability. Our newest research defines the cost uncertainty using confidence intervals as discussed in the peer-reviewed article "Quantifying Uncertainty and Variable Sensitivity within the U.S. Billion-dollar Weather and Climate Disaster Cost Estimates" (Smith and Matthews, 2015). This research is a next step to enhance the value and usability of estimated disaster costs given data limitations and inherent complexities.

The most recent analysis offers new graphing options to better visualize event costs over time. These options include: 1) annual U.S. disaster costs for billion-dollar events including 95% confidence interval estimates of cost uncertainty and 2) the 5-year cost mean. The 95% confidence interval (CI) probability is a representation of the uncertainty associated with the disaster cost estimates. Monte Carlo simulations were used to produce the upper and lower bounds (Smith and Matthews, 2015).

For more in-depth analysis, the following report offers the latest summary on the 2022 U.S. billion-dollar weather and climate disasters in historical context .

In addition, see: Calculating the Cost of Weather and Climate Disasters.

Citing this information:

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