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## Understanding NOAA's "Billion-Dollar Disasters"

Each year, communities across the United States experience loss of life, injuries, and property damage from disasters related to weather and climate. The National Oceanic and Atmospheric Administration (NOAA) is the primary federal civilian agency responsible for forecasting and tracking these events in the United States. The agency also calculates the events' economic and societal impacts. NOAA terms events that exceed \$1 billion dollars in damages *billion-dollar disasters*. In 2024, NOAA concluded there were 27 U.S. billion-dollar disasters, for a total cost of \$182.7 billion (**Figure 1**).

NOAA estimates have informed federal policy and legislative debates around whether to provide federal funding to communities affected by such disasters, whether to issue new federal regulations, and other considerations. Some stakeholders have raised concerns regarding the agency's methodology (described below). What goes into NOAA's cost estimates of the damages from weather and climate events? How do stakeholders interpret the results? What is the potential congressional role in such calculations?

### Calculating Disaster Costs

NOAA has tracked the costs associated with weather and climate events for 1980 through the present, including drought/heat waves, flooding, hail, severe weather, tornado outbreaks, tropical cyclones, wildfire, and winter storms/cold waves. NOAA uses a range of public and private data sources to determine the economic impacts of weather and climate disasters. These sources include information from NOAA and from federal entities such as the Energy Information Administration, Federal Emergency Management Agency (FEMA), Federal Highway Administration, Insurance Services Office, National Interagency Fire Center, U.S. Army Corps of Engineers, U.S. Department of Agriculture, and U.S. Department of Defense. NOAA also uses data from state agencies, private property insurers, and other partners.

Economists use a range of terms to describe costs related to weather and climate events. They generally distinguish between *direct* and *indirect* costs (e.g., immediate physical consequences vs. longer-term, broader-scale effects) and between *market* (tangible) and *non-market* (intangible) costs (e.g., effects on goods and services traded or not traded in markets). NOAA's estimates include direct costs related to physical damage to residential, commercial, and government or municipal buildings and assets within a building; interruptions (e.g., business interruption, loss of living quarters); physical damages to vehicles, boats, offshore energy platforms, electrical infrastructure, military bases, public infrastructure (e.g., roads, bridges, levees), and agricultural assets (e.g., crops, livestock, timber); and

wildfire suppression costs. NOAA does not take into account losses related to natural capital or assets (e.g., forests, wetlands, water bodies) and their degradation, health care-related costs, the value of a statistical life, or supply chain or other related costs.

NOAA adjusts previous years' event estimates for inflation using the Consumer Price Index for the current year. That results in past sub-\$1 billion events being added over time, as their adjusted estimates pass the \$1 billion threshold. NOAA also adjusts event estimates as the agency receives additional data about losses from an event.

### Stakeholder Considerations

Various stakeholders—such as some governmental bodies, academics, and media outlets—have valued NOAA's estimates as a way to convey the magnitude of, and allow comparisons between, weather and climate-related disasters over time. Some experts, stakeholders, and NOAA itself have noted potential concerns or considerations when calculating or interpreting the agency's cost estimates.

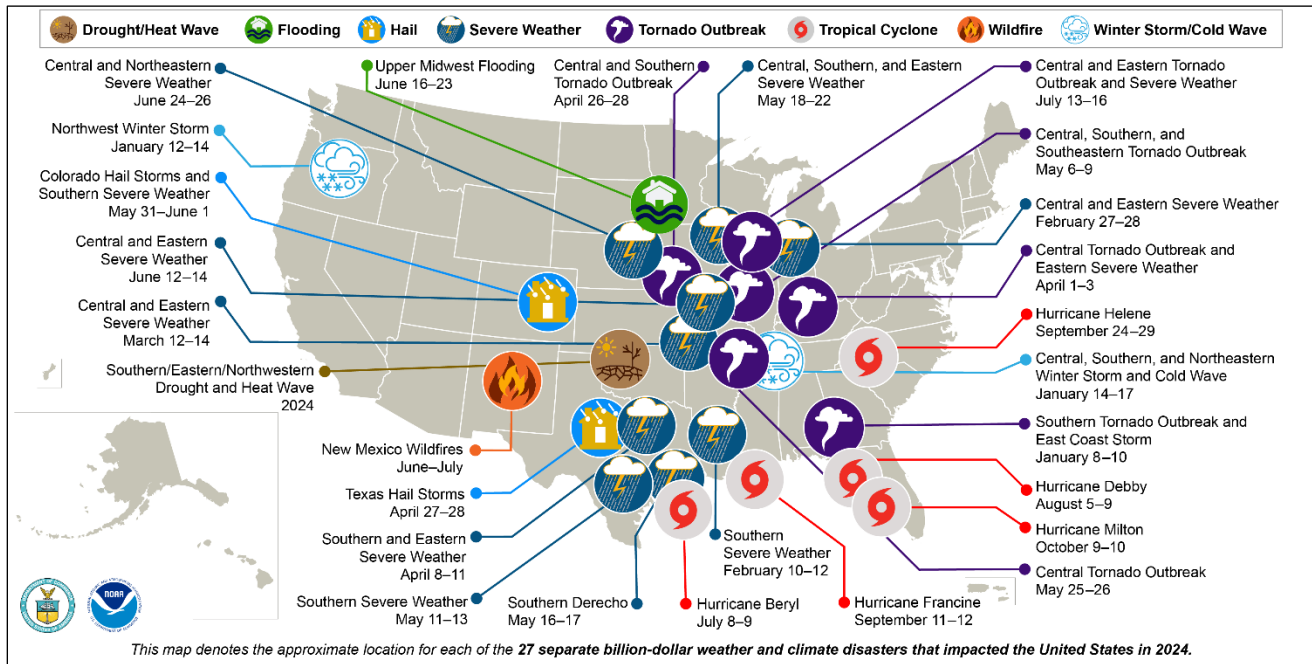
**Factors Unrelated to Weather and Climate.** A concern raised about billion-dollar disaster estimates is how the estimates account for factors unrelated to weather and climate. NOAA and other stakeholders have acknowledged that some of the major drivers in disaster costs have been increases in population, development, construction costs, and wealth—especially in vulnerable areas—across the United States. Some observers argue that more granular approaches have identified a downward trend in losses, once population growth and wealth are accounted for.

**Type of Disaster.** Another consideration relates to the uncertainty of cost estimates depending on the type of disaster event. For example, the quality of data regarding a short-term event in a small geographic area may be higher than data quality for a long-term event across a broader swath of the country, resulting in greater certainty of cost estimates for the former type of event. NOAA noted this limitation in 2024, citing cost estimates for five tropical cyclones, Upper Midwest flooding, and the multi-region drought and heatwave as having greater potential uncertainty due to "less coverage of insured assets and data latency [i.e., delay]." In other instances, events such as extreme heat or wildfire smoke may vary within a short distance from the event center and/or may not cause physical damage to infrastructure.

**Sub-Billion-Dollar Events.** NOAA and other stakeholders (e.g., insurers) have noted high costs related to relatively moderate weather and climate events that occur on a frequent basis. Less costly events that occur over the course of the year and across the country are not currently included in NOAA's public estimates. In response, NOAA has been

developing methodology to quantify costs for sub-billion-dollar events, down to \$100 million.

**Figure 1. U.S. 2024 Billion-Dollar Weather and Climate Disasters**



**Source:** National Oceanic and Atmospheric Administration, "Overview."

**Calculation Methodology.** Some observers have perceived inconsistencies or a lack of transparency in NOAA's estimate methodologies. They suggest NOAA should provide more documentation to explain how the agency calculates costs related to business interruption, wildfire suppression, and livestock feeding (typically denoted as "other" in NOAA's calculations); how and why past events are added or removed from the overall dataset; and how event costs are altered over time (outside of inflation adjustments), among others. In response, NOAA has stated that the estimates rely only on direct costs, that its methodologies are described in a 2015 peer-reviewed NOAA article, and that changes in estimates are due to updates and additions to the input data and not changes in methodology. NOAA has stated it will develop a consistent peer review process of its methodology every five years.

**Comparison to Other Estimates.** NOAA's cost estimates are sometimes lower or greater than estimates by other entities for a particular year or disaster (see, for example, Munich Re's 2024 estimate or a researcher's comparison). According to some observers, it is unclear how and why that may be the case based on the information the agency provides publicly. NOAA has stated it compares its findings to other independent disaster estimates that use similar data sources and methods and has agreed its comparison procedure should be formalized and stated publicly.

## Potential Congressional Considerations

Some Members of Congress have advocated for the utility of disaster cost estimates and have expressed interest (e.g., H.R. 403 in the 119<sup>th</sup> Congress) in establishing standards and tracking national disaster losses, as suggested by some stakeholders. Congress could consider whether to direct

NOAA and other federal entities to make adjustments to cost-estimating practices based on stakeholder concerns. For example, options could include directing NOAA to

- coordinate with the Government Accountability Office; National Academies of Sciences, Engineering, and Medicine; or another group to evaluate NOAA's methodology and provide recommendations;
- advance and publicly share cost estimates that account for factors such as local population, development, and wealth;
- provide detailed explanations of its methodologies, including costs that fall under the agency's "other" category, for individual events;
- develop a plan to incorporate currently unaccounted-for costs such as losses of natural capital or assets (e.g., forests, wetlands, water bodies) and their degradation; and/or
- increase its work with the private sector, either through voluntary agreements or through commercial data contracts, to obtain additional data and/or technical assistance to improve its methodologies and estimates.

Congress also may consider whether to require other federal entities to collect data and provide it to NOAA or whether to instruct NOAA to collaborate with other federal agencies more broadly when preparing disaster cost estimates.

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