

Billion Dollar Losses, Trillion Dollar Threats

The Cost of Climate Change






Prepared by PSE Healthy Energy
for E2 (Environmental Entrepreneurs)
Elena Krieger, PhD

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About This Report

This report reviews the historic and projected economic toll of weather and climate disasters across the United States since 1980. It assess trends related to specific types of disasters—such as wildfires or hurricanes—as well as across regions, sectors, and over the course of decades. Such an analysis inherently reflects uncertainty associated with both historic impacts, for which data can be limited, as well as for future projections, which depend on future emissions scenarios and complex climate modeling. This analysis largely discusses total economic impacts of these disasters, but this metric is somewhat limited as well: it may be much harder for a low-income household to recover from the flooding of a less expensive house than for a wealthier household to recover from damage to a more expensive house, even if the total monetary damage of the latter is larger. Given these limitations, the report still aims to summarize the scale of weather and climate damage across the United States, the risk of escalating costs in a warming climate, and the need to rapidly invest in both climate mitigation and adaptation.

About PSE Healthy Energy

PSE Healthy Energy is an independent energy science and policy nonprofit research institute. Founded in 2010, our mission is to generate science-based energy and climate solutions that protect public health and the environment. PSE has a unique commitment to making science understandable and actionable. Our scientists work with policymakers, community-based organizations, government, and other stakeholders to advance a healthy, resilient, and equitable energy future. For more information, see www.psehealthyenergy.org or follows on Twitter at @PhySciEng.

About E2

Environmental Entrepreneurs (E2) is a national, nonpartisan group of business leaders, investors, and professionals from every sector of the economy who advocate for smart policies that are good for the economy and good for the environment. Our members have founded or funded more than 2,500 companies, created more than 600,000 jobs, and manage more than $100 billion in venture and private equity capital. For more information, see www.e2.org or follow us on Twitter at @e2org.

Acknowledgments

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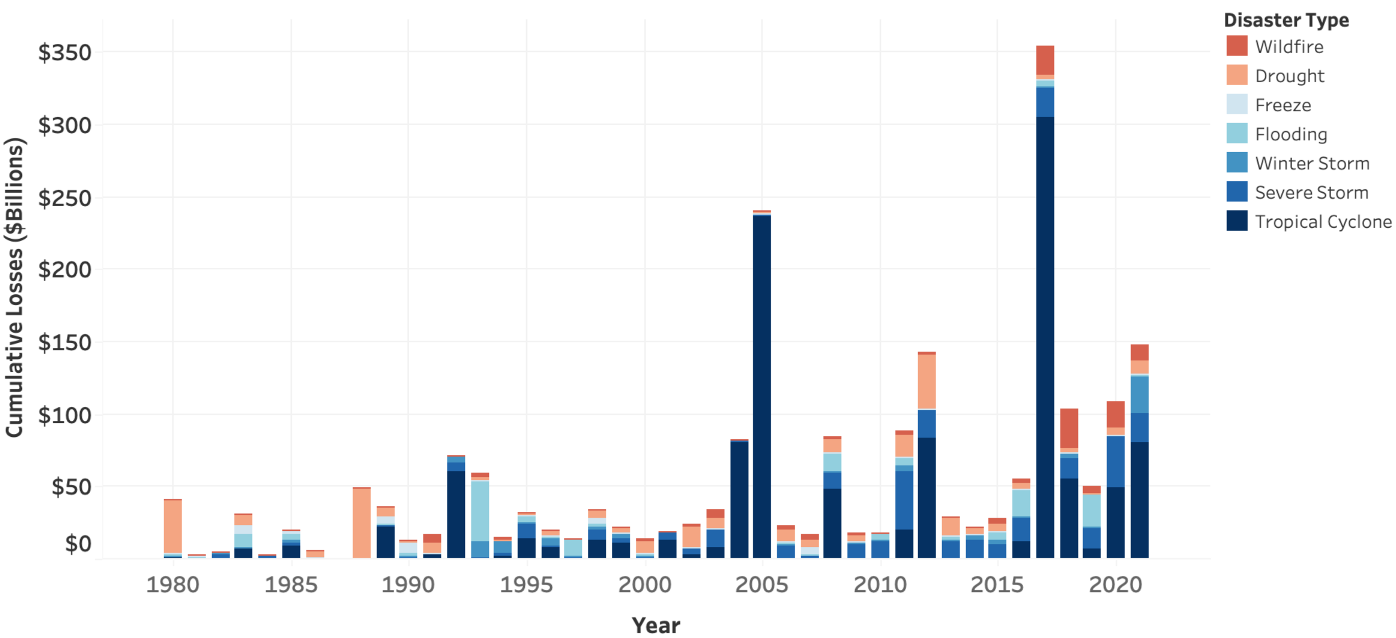
1. Billion-Dollar Losses, Trillion-Dollar Threats: Climate and Weather Disasters Across the United States

Billion-dollar weather and climate disasters in the form of hurricanes, severe storms, drought, flooding, wildfires, winter storms, and freezing have led to $2.2 trillion in losses since 1980 (NOAA, 2022). Across the United States, climate change is exacerbating extreme weather events and severely damaging infrastructure, buildings, roads, and cropland. Annual losses from billion-dollar disasters during the last five years—totalling $765 billion in losses and more than 4,500 deaths from 2017 to 2021—were nearly eight times higher than in the 1980s (see **Figure 1**) (NOAA, 2022). While billion-dollar disasters are responsible for an estimated 80 percent of total disaster-related losses, the combination of smaller disasters, heat waves, and ongoing business disruptions that are not captured mean the overall economic turmoil is even greater than this analysis details.

Climate change is not the sole driver of natural disasters, but it contributes to their frequency and severity. The world has warmed nearly 1.1 ˚C since 1880 (NASA, 2022), and warming is likely to exceed 1.5 ˚C in the near term, even with significant efforts to curb greenhouse gas emissions (Pörtner, 2022). Each year from 2001 through 2021 were among the 22 hottest years on record (NASA, 2022), and record-breaking temperatures led to a new high of 130 ˚F in Death Valley in 2021.[1] These extreme weather events have widespread impacts: a recent analysis from the Washington Post estimated that in 2021 alone, a federal disaster emergency was declared in the home county of more than 40 percent of Americans (Kaplan et al., 2022).

The frequency of climate-related disasters are rising, too. Between 2017 and 2021, the United States experienced its four most-expensive wildfires, two of its three most expensive hurricanes, and its most expensive winter storm (NOAA, 2022). The percentage of state's total historic weather and climate disaster losses that occurred in the last 5 years is shown in **Figure 3**.

Figure 1 // Billion-dollar disasters across the U.S. are growing in number and severity (data source: NOAA, 2022).



1 Reliably-measured temperature. An earlier 134 ˚F reading in Death Valley has been disputed (Masters, 2021).

// A Growing Toll

5-Year Disaster Costs: $765 Billion
33 percent of all billion-dollar disaster costs since 1980 in the U.S. (CPI adjusted) have occurred in the last 5 years, totaling $765 billion (NOAA, 2022).

Record-Breaking Heat: 130˚F
World record for highest reliably-measured temperature set at Furnace Creek, Death Valley on July 9, 2021 (Masters, 2021).

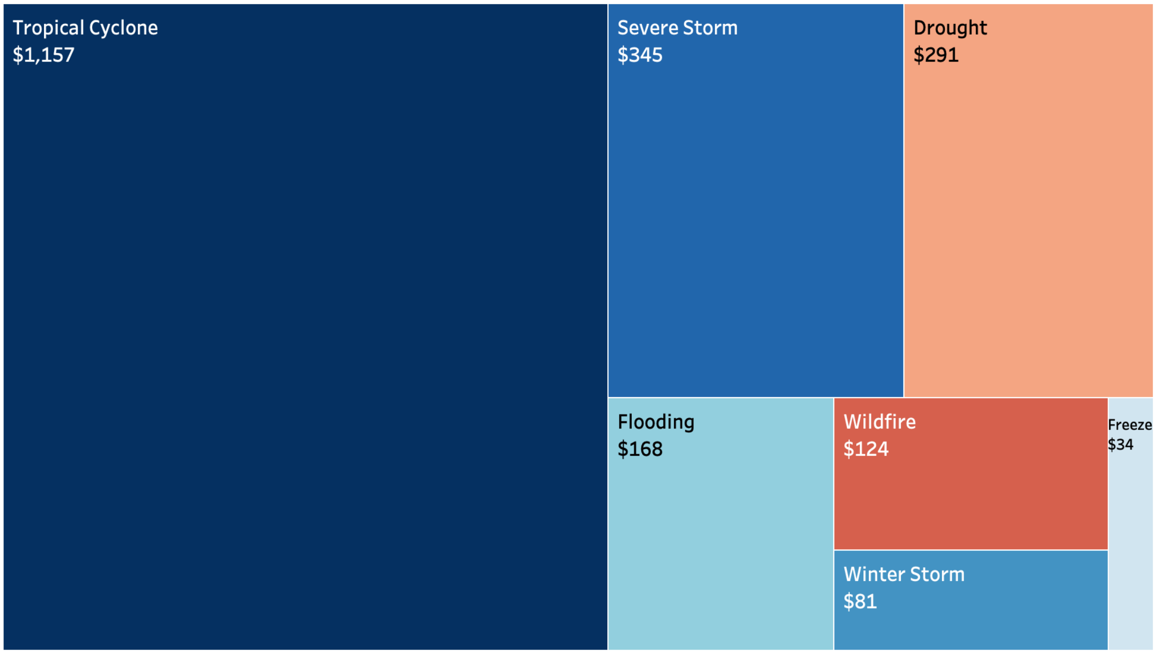
Too Many Atlantic Hurricanes to Name
2020 brought a record high of 30 named storms, so officials turned to Greek letters after the alphabet ran out (NOAA, 2020).

Drought and Water Shortfalls
In April 2022, water in Lake Powell fell to 22 percent of its maximum, a new low reflecting water shortages across the Southwest (ESA, 2022).

Tens of Thousands of Wildfires
In 2015, for the first time since 1960, more than 10 million acres of land burned. 2017 and 2020 passed this threshold again (CRS, 2022).

Not all populations, regions, and economic sectors face the same level of risk from climate change. The escalating economic toll of climate-driven extreme weather events poses an outsized threat to certain sectors, such as agriculture, as well as certain populations, such as outdoor workers. Estimates suggest that the United States will lose 1.2 percent of its gross domestic product (GDP) for every degree Celsius of warming. However, these impacts are predicted to fall disproportionately on those with the least resources: the poorest third of counties are projected to see losses reaching between 2 and 20 percent of county income per degree of warming (Hsiang et al., 2017). Heat impacts are projected to be particularly high for vulnerable communities across Texas, New Mexico, California, Louisiana, and Arkansas (USGCRP, 2018); wildfire threatens counties from Arizona and California to Texas, Florida, and New Jersey (First Street Foundation, 2022), particularly those living at the wildland-urban interface.

Figure 2 // Billion-dollar climate- and weather-related disasters accounted for 80 percent of disaster-related losses, totaling $2.2 trillion from 1980-2021 (shown in $billions below). These damages are dominated by tropical cyclones, severe storms, and drought, followed by flooding, wildfires, winter storms, and freezes (data source: NOAA, 2022).



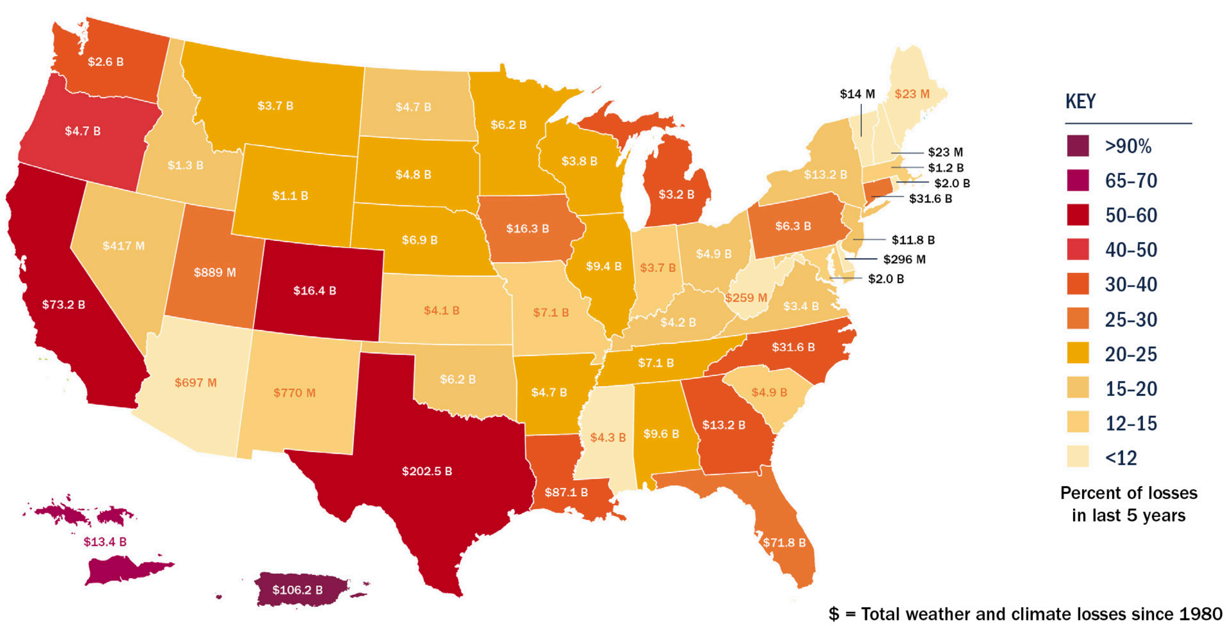
Projections now show that the cost of inaction on climate change greatly outweighs the cost of action. The U.S. Office of Management and Budget estimates climate-driven GDP losses of 3-10 percent by the end of the century under current policy (Vahlsing & Yagan, 2022). Various projections suggested that failing to address climate change will put 2 million jobs at risk by 2070, create a $14.5 trillion loss in GDP over the next 50 years (Philip et al., 2022), and lead to $200 billion in annual damages in 2050 and $500 billion in 2090 (Martinich & Crimins, 2019).

Rapid and sustained investment in climate mitigation and adaptation can help avert the worst of these impacts and protect those communities who are disproportionately at risk while providing opportunities in the form of jobs and economic growth. Investments to decarbonize the United States economy by 2050 could realize up to $3 trillion in GDP growth (Philip et al., 2022). And even moderate steps to reduce warming could reduce climate-related damages by 17 percent in 2050 and cut them nearly in half in 2090 (Martinich & Crimins, 2019).[2] Investments to decarbonize the economy, such as renewable energy and energy efficiency resources, can help mitigate climate change, and resilient infrastructure investments can help communities adapt to ongoing hazards and risks. Investing in mitigation and adaptation in the near term can help reduce the long-term impacts of climate change to the economy, environment, and human health.

// Disproportionate Impacts

Low-income communities, communities of color, and other historically underserved and overburdened face elevated risks from climate change. Recent research has found that future flooding is more likely to occur in low-income neighborhoods, communities of color, and places with a disproportionate share of industrial pollution (Marlow, 2022). Historically redlined communities which are still disproportionately home to people of color are more likely to be heat islands today (Plumer & Popovich, 2020), increasing risks for these populations as temperatures rise. Not addressing these inequities in climate policy risks exacerbating environmental health and socioeconomic inequities (Shonkoff et al, 2011), but targeted investments co-designed with communities can help reduce the disproportionate impacts of extreme weather (NASEM, 2022).

Figure 3 // Percentage of state's total historic losses from weather and climate disasters in last 5 years (total losses shown in text) (data source: NOAA, 2022).



2 Compares RCA 8.5 and RCA 4.5 warming scenarios, undiscounted 2015$.

2. Regional Threats and Damages

Climate change poses unique risks to each region across the United States, varying from state to state and even from neighborhood to neighborhood. Coastal areas will continue to be more prone to flooding from storm surge. Populations living in urban heat islands are likely to face more heat risk than those in greener parts of the same cities. In some cases, existing weather and climate risks will be amplified; in others, entirely new risks will threaten communities. But while all regions are unique, every U.S. state has faced at least one billion-dollar disaster event since 1980.

Figure 3 shows the dominant billion-dollar climate disaster type for each state in the United States, based on total cumulative losses from 1980-2021. The Gulf and Atlantic coasts are regularly hit by hurricanes, are threatened by sea level rise, and face heavy losses from winter storms, whose impacts stretch up through the Northeast. The West has been increasingly ravaged by wildfires, compounded by long stretches of drought. Midwestern infrastructure and agriculture face losses from droughts, flooding, and storms. The share of the total damage borne by each region is shown in **Figure 4**.

These historic cumulative impacts from 1980 to 2021 are shown, for each state and territory, in **Figure 6.** The largest cumulative losses have been seen in Texas, Louisiana, Florida, California, and Puerto Rico. As a percentage of GDP, however, the U.S. Virgin Islands, Puerto Rico, Louisiana, Mississippi, and North and South Dakota have faced the highest losses from billion-dollar events. A list of each state and historic damages is available in **Appendix I**, and damages in the last five years by state are provided in **Appendix II. Appendices III** and **IV** provide average annual weather and climate losses to buildings, agriculture, and human life by county and by congressional district. The magnitude and distribution of these impacts are likely to shift in the future as increasing greenhouse gas concentrations induce changes to weather and climate patterns, as discussed in the following sections.

Figure 4 // Disaster type responsible for largest cumulative losses in each state, 1980-2021 (data source: NOAA, 2022).

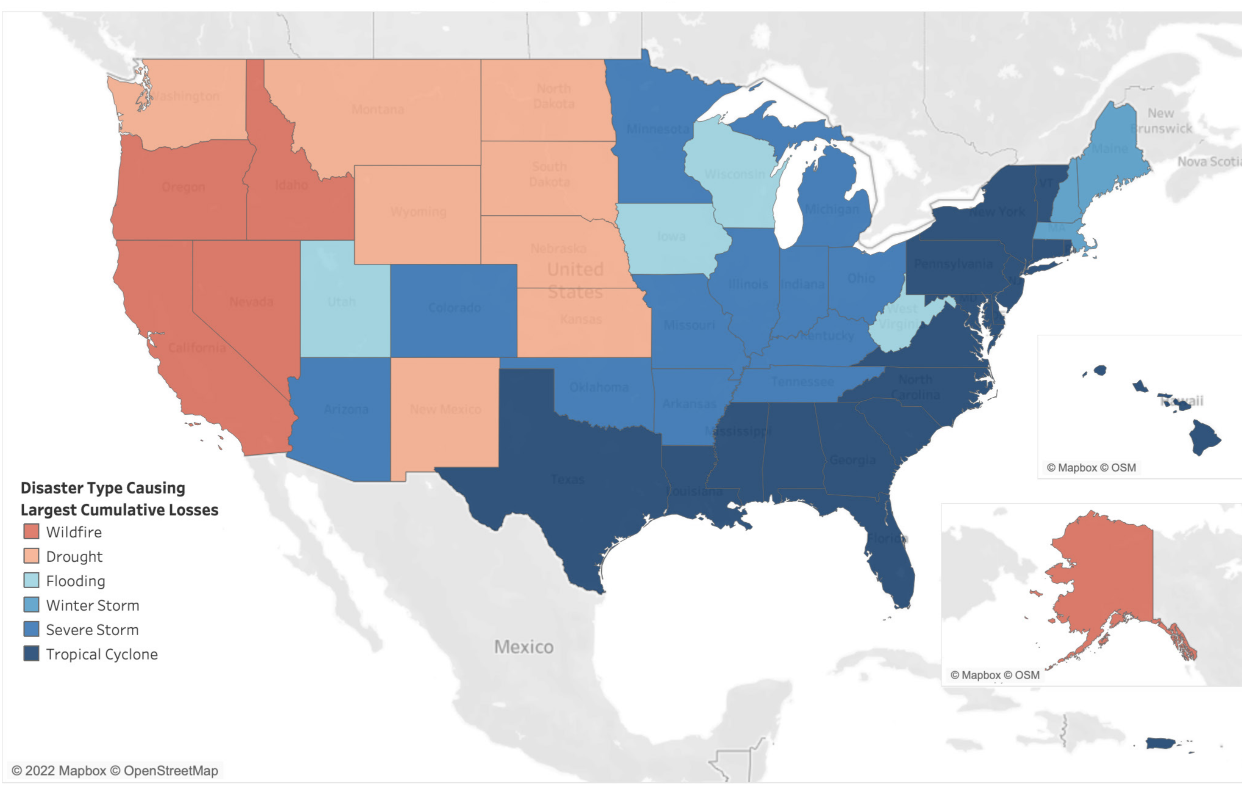
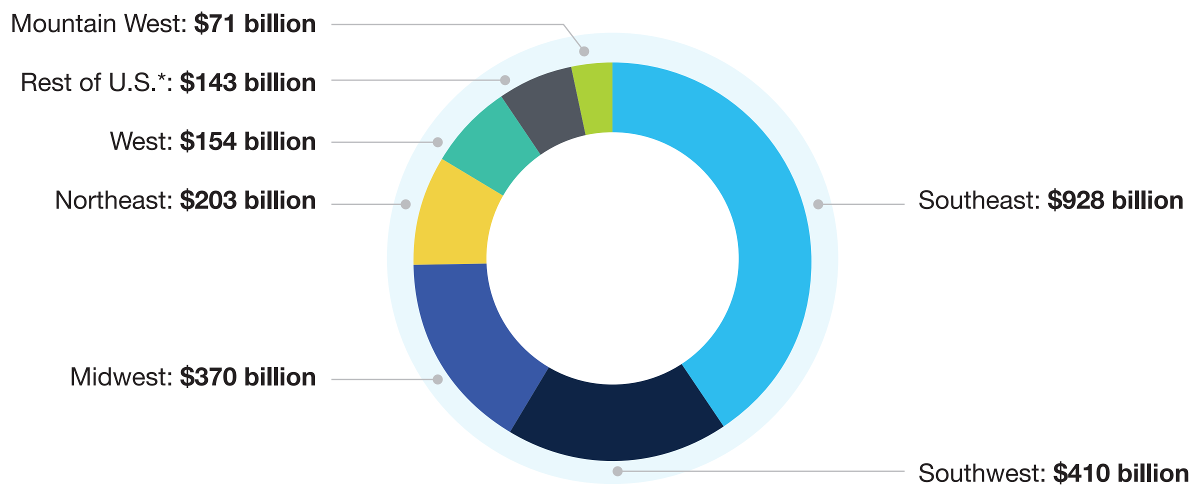
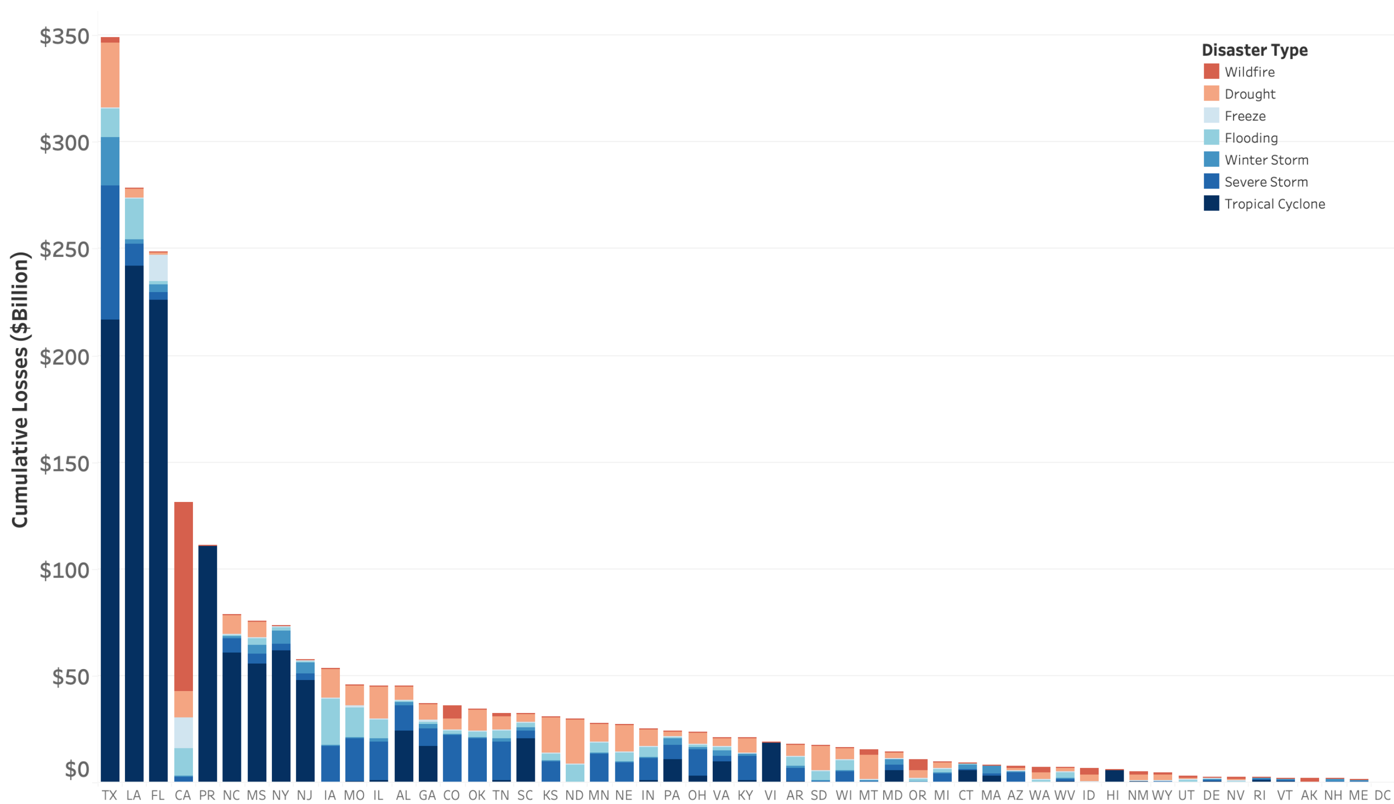


Figure 5 // Regional share of billion-dollar disaster losses 1980-mid 2022 (CPI-adjusted) (data source: NOAA, 2022).



* Rest of U.S. includes Puerto Rico, the District of Columbia, and the Virgin Islands

Figure 6 // Cumulative billion-dollar disaster losses for each state (data source: NOAA, 2022).



3. From Wildfires to Heatwaves: The Growing Impact of Climate Disasters

Climate change is expected to contribute to increasingly frequent and more extreme weather events such as hurricanes and winter storms, flooding, sea level rise, heat waves, wildfires, and drought, among other impacts. These events can interact with each other to compound the effects of any individual disaster. In turn, these impacts can adversely affect human health, infrastructure, agriculture, and the natural environment. The following sections detail some of these climate impacts.

// The Marshall Fire

On December 30, 2021, wind gusts over 100 miles per hour accelerated flames from a fire outside Boulder, Colorado, ultimately destroying more than 1,000 buildings and leading to two deaths and additional injuries. The Marshall Fire, burning at the end of a lengthening fire season after an autumn of recording-breaking heat and drought, proved to be the most destructive in state history (Lindsey, 2022; Chuck, 2022).

3.1 Wildfires

Climate change is lengthening the wildfire season and leading to larger and more destructive wildfires. Longer, hotter summers and worsening drought dry out shrubs and other flora which act as fuel for wildfires. Pine bark beetles have added to this fuel mix by killing nearly five percent of trees over the last 20 years (Hicke et al., 2020), a result of their reproductive season expanding during the lengthening summers (Robbins et al., 2021). These risk factors have been compounded by poor forest management, lack of maintenance of power systems whose failure can spark wildfires, and growing numbers of people living at the wildland-urban interface.

As the impact of wildfires increases, so does their economic toll. More than 200 million acres have burned across the United States since 1980 (NIFC, 2022), causing $124 billion in damages (NOAA, 2022). The share of wildfire damages borne by each state is shown in **Figure 7**. Two-thirds of these losses have occurred in the last five years. Estimates suggest that nearly half of the burned acreage can be attributed to climate change (Abatzoglou & Williams, 2016). Annual acres burned are shown in **Figure 8.**

Figure 7 // States share of wildfire damage 1980-mid 2022 billion-dollar disaster costs (CPI-adjusted) (data source: NOAA, 2022).

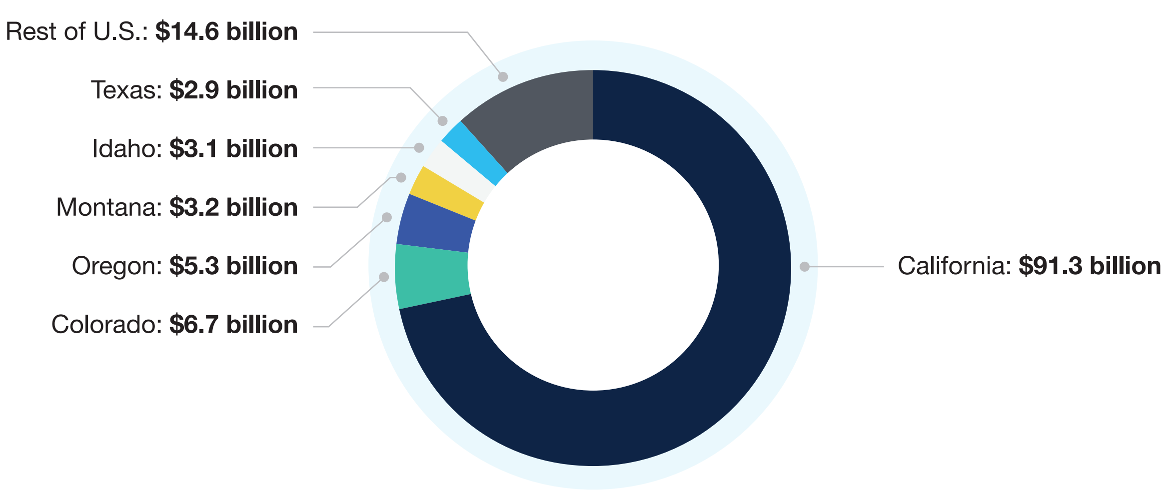
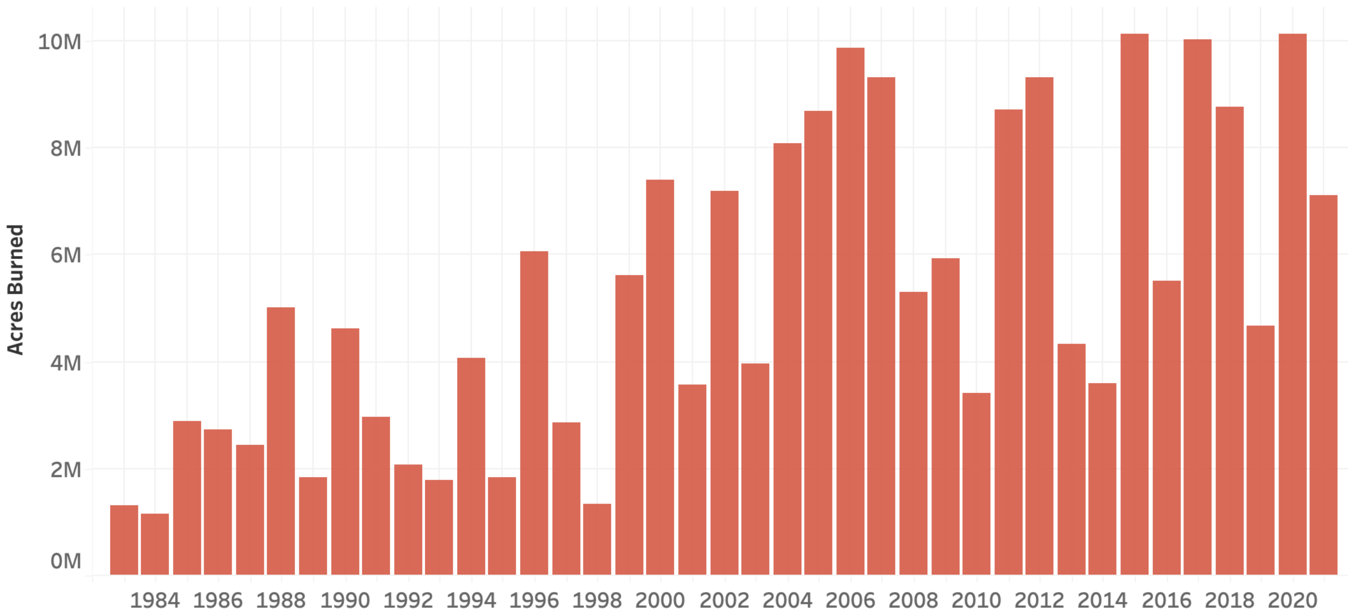


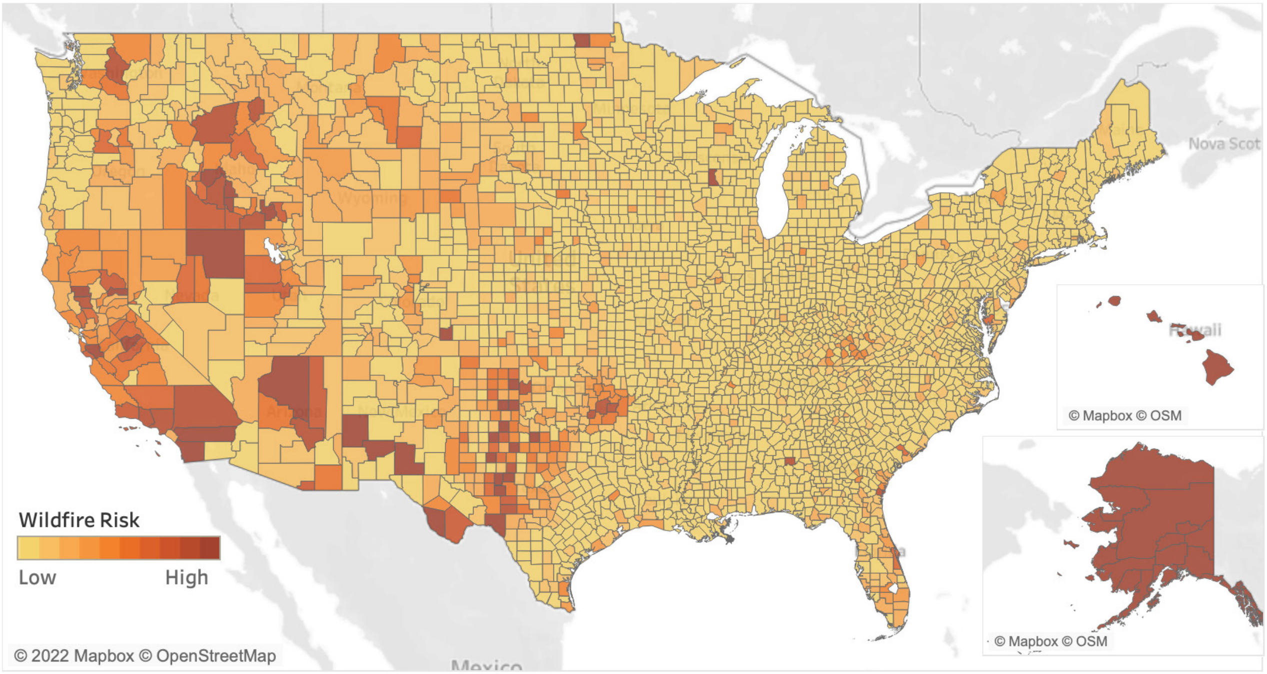
Figure 8 // More than 200 million acres have burned across the United States in the last four decades, growing in recent years (data source: NIFC, 2022).



The effects of growing wildfires have been particularly acute in the Western United States and Alaska. Alaskan wildfires are contributing to the melting of permafrost, enabling it to dry out and fuel additional fires in a destructive cycle (Jandt & York, 2021). Wildfires produce not only carbon dioxide but also soot, which can land on snow and absorb sunlight, accelerating the melting process (Patel, 2019). Dark orange skies and smoky air are becoming familiar signs across the Pacific coast and throughout the Rocky Mountain states and the Southwest, and wildfires are becoming increasingly devastating. In one incident in 2018, failed power line equipment sparked the Camp Fire in Northern California, killing a record 85 people and destroying nearly 19,000 structures. In August 2020, lightning ignited the August Complex again in Northern California, burning a record-breaking million acres; at the same time, the SCU Lightning Complex burned another 400,000 acres a couple hundred miles south (CAL FIRE, 2022). The air Californians breathe inside and outside their homes became saturated with smoke for weeks.

In addition to direct costs, exposure to wildfire smoke can lead to cardiovascular and respiratory health impacts and costs, including an estimated 6,000 premature deaths per year across the United States (O'Dell et al., 2021). Smoke poses an increased risk to children, the elderly, and outdoor workers (Hill et al., 2020), and is associated with an increased risk of contracting COVID-19 (Zhou et al., 2021). In summer 2021, wildfire smoke from the Pacific Northwest and Canada led to unhealthy air pollution concentrations as far away as Minnesota (MPCA, 2022). Utilities across California have started to de-energize power lines (controlled grid outages to shut off electricity through transmission lines in specific areas) to prevent wildfires, which itself has likely caused billions of dollars more in economic impacts from business interruptions and poses a risk to many populations, such as those dependent on electricity to power medical equipment (Murphy, 2021).

Figure 9 // Wildfire risk across the United States, characterized by expected annual loss as a fraction of total exposure for buildings, agriculture, and human life (data source: FEMA, 2022).



Wildfire risk areas are shown in **Figure 9.** Regions at risk from wildfire are projected to grow in the coming years. First Street Foundation estimates that 69 percent of properties in New Mexico have at least a one percent chance of burning in the next 30 years, followed by 67 percent of Wyoming properties, 59 percent in Arizona, 58 percent in Utah, and 51 percent in Oklahoma. Colorado, Alabama, Mississippi, Texas, and Montana face the greatest increase in risk in the coming years. The counties with the highest number of properties at risk are in Riverside, CA; Maricopa, AZ; Los Angeles, CA; San Bernardino, CA; and Polk County, FL. The highest percent of structures at risk are in Los Alamos, NM; Mason, TX; Harding, NM; Colfax, NM; and Gillespie, TX (First Street Foundation, 2022). Insurers have begun to deny insurance to homeowners in high-risk areas (see **Table 1**). California issued a series of moratoria on fire insurance non-renewals, and more than 200,000 property owners have turned to the state-run FAIR plan because they have been denied coverage by traditional insurers (CDI, 2021). For those who have received insurance in fire-prone areas, premiums have been increasing and are projected to continue to rise (Dixon et al., 2020).

3.2 Hurricanes

Warming ocean surfaces and air temperatures contribute to growing hurricane intensity, and the impacts of hurricanes compound with sea level rise to increase storm surge and coastal damage (Colbert, 2022). Hurricanes are responsible for more than half of historic billion-dollar climate disasters, reaching $1.2 trillion in losses from 1980 to 2021. Hurricanes have had the highest toll as a fraction of gross state product in the U.S. Virgin Islands, Puerto Rico, Louisiana, Mississippi, and Florida. Louisiana alone has seen more than $250 billion in hurricane damage.

Hurricanes have been growing in intensity in recent years. The year 2020 saw the most active Atlantic hurricane season to date, including 30 named storms and a record-breaking 12 that made landfall (NOAA, 2021). In 2017, the slow-moving Hurricane Harvey dropped over 30 inches of rain on 7 million people, flooding the Houston area, damaging or destroying more than 200,000 buildings, and causing $140 billion in damage and 89 deaths (NOAA,

Table 1 // Top ten counties with highest number of properties at risk to wildfire damage in 2022 (data source: First Street Foundation, 2022).

County	State	# Properties
Riverside	California	684,400
Maricopa	Arizona	683,300
Los Angeles	California	514,500
San Bernadino	California	471,700
Polk	Florida	335,100
Pima	Arizona	283,200
San Diego	California	277,400
Kern	California	236,300
Ocean	New Jersey	220,000
Pasco	Florida	210,500

2022). Harvey contaminated the region's water by causing flooding of Superfund and toxic chemical sites, the spillage of 22,000 barrels of oil and other associated waste, the release of 365 tons of toxic chemicals (Flitter & Valdmanis, 2017), and more than 25 million gallons of sewage overflow (TCEQ, 2017). The same year, Hurricane Maria devastated Puerto Rico. The storm led to at least 3,000 deaths, and left many without water, power, or cell service for months (Feldscher, 2018). The same month, Hurricane Irma hit the U.S. Virgin Islands and Florida marking the first time three category 4+ storms have hit the United States in the same year (NOAA, 2022). The increasing frequency of hurricanes and tropical storms also increases the likelihood that a disaster will hit before a community has fully recovered from the last event. The share of hurricane damage seen by each state is shown in **Figure 10**.

Sea level rise, coupled with coastal subsidence and growing hurricane impacts, has also threatened coastal properties, particularly along the Atlantic and Gulf coasts. These impacts are particularly dramatic in places like Hampton Roads, Va., where tidal flooding frequently blocks roads and hurricanes drive many feet of storm surge. Flooding in the Hampton Roads region also threatens national security. The

Figure 10 // Share of hurricane damage 1980-mid 2022 billion-dollar disaster costs (CPI-adjusted) (data source: NOAA, 2022).

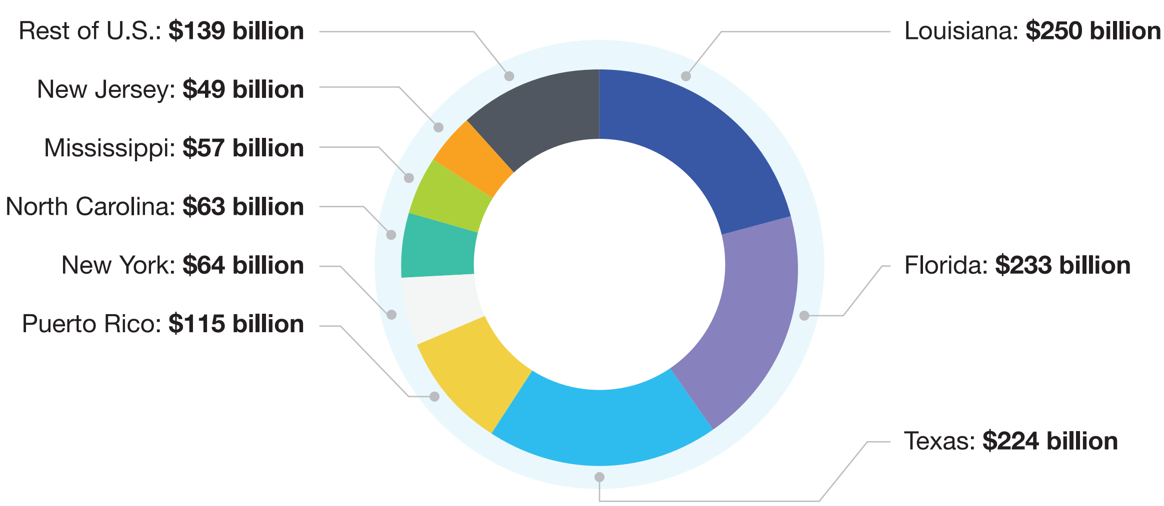
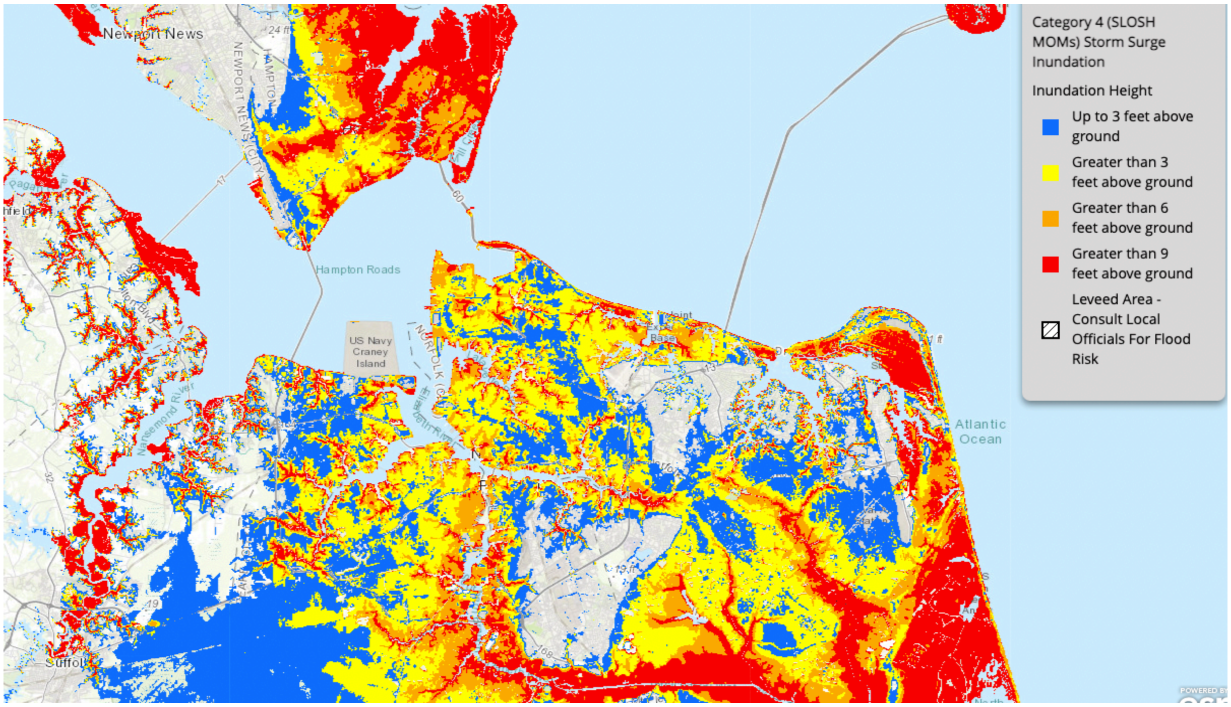


Figure 11 // Storm surge risk from a category 4+ hurricane in the Hampton Roads region of Virginia (image source: NOAA/NWS/NHC, 2022).



region is home to the largest naval base in the world, Naval Station Norfolk—home to six of the nation's 11 aircraft carriers (McLeary, 2019) and 75 ships—alongside dozens of other military installations. Sea level in Norfolk has already risen 18 inches and is projected to increase by one to three feet by 2050 (Lopez, 2021). **Figure 11** shows the flooding risk from a category 4 storm in the Hamptons Road region.

// Mississippi Flooding

In 2019, months of heavy rainfall caused historic flooding down the length of the Mississippi River, causing $6.9 billion in losses (NOAA, 2022). The flood duration broke records, lasting more than 200 days in some places (NWS, 2022). Rainfall and flooding across the Midwest prevented farmers from planting more than 14 million acres (USDA/FSA, 2019). Since 2001, the Mississippi River Critical Conservation Area has received $1.5 billion in federal insurance payouts for flooding damage (EWG, 2022).

3.3 Severe Storms, Extreme Weather, and Flooding

Climate change is amplifying extreme weather events, intensifying storms, and shifting rainfall patterns. From 1980 to 2021, billion-dollar disasters in the form of severe storms (excluding hurricanes), winter storms, and freezing resulted in $460 billion in losses across the United States, including more than 3,400 deaths. Flooding added another $168 billion in losses and 634 deaths (NOAA, 2022). Each state's share of damages from flooding, severe storms, and winter storms and freezing are shown in **Figures 12-14**.

A recent review of more than 350 global studies on the relationship between climate change and extreme weather events found that climate change made 70 percent of events more likely or more severe, and nine percent less likely or less severe (Pidcock & McSweeney, 2021). The top 10 cities for estimated 2021 flood loss and for projected increase in flood loss by 2050 are shown in **Table 2** (from First Street Foundation, 2021).

Figure 12 // Share of flooding damage 1980-mid 2022 billion-dollar disaster costs (CPI-adjusted) (data source: NOAA, 2022).

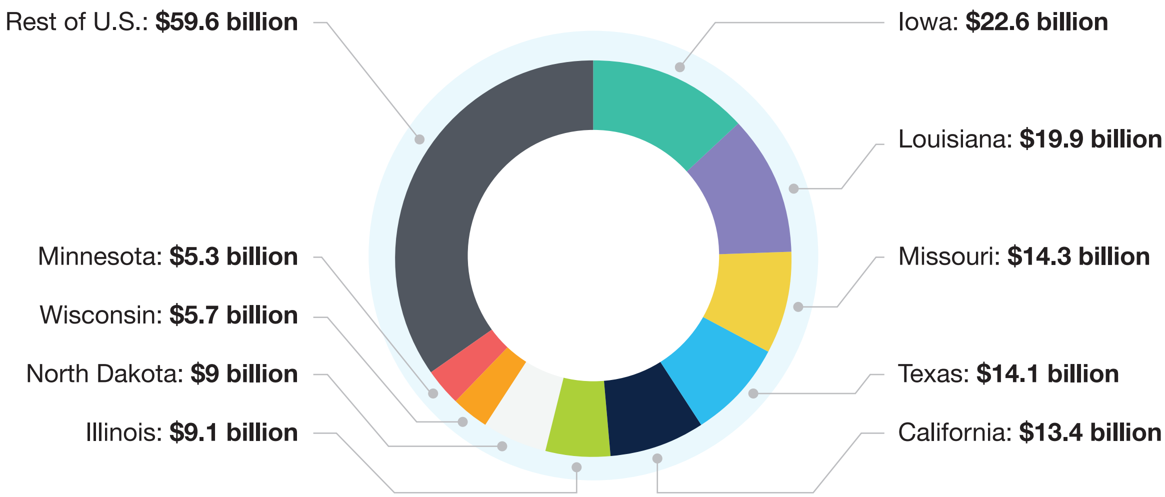


Figure 13 // Share of severe storm damage 1980-mid 2022 billion-dollar disaster costs (CPI-adjusted) (data source: NOAA, 2022).

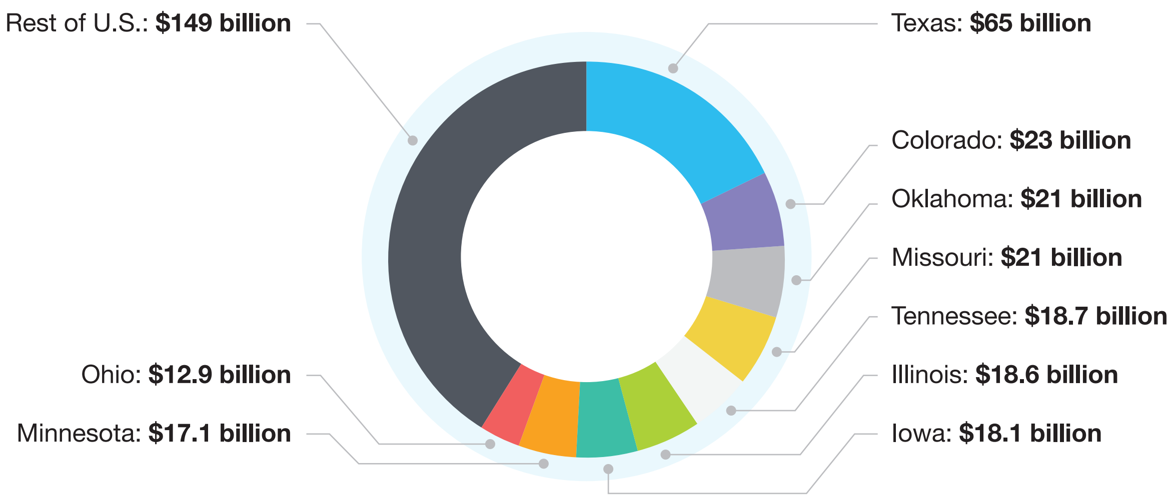
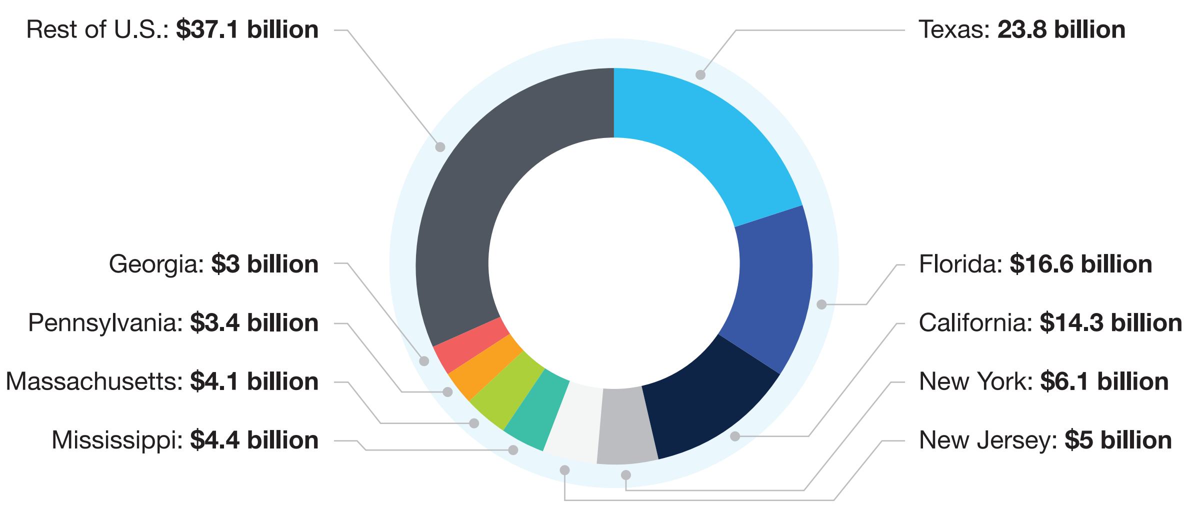


Figure 14 // Share of winter storms and freezing damage 1980-mid 2022 billion-dollar disaster costs (CPI-adjusted) (data source: NOAA, 2022).



More than a quarter of combined losses from severe storms, winter storms, freezing, and flooding over the last 40 years in the United States occurred in just the last five years (NOAA, 2022). Their impacts have been highest across the South, East Coast, and Midwest, but nearly every part of the country has been affected. Global warming models suggest an increase in extreme rainfall in the Northeast and Pacific Northwest (USGCRP, 2018). Extreme storms can be deadly. In February 2021, a winter storm froze power infrastructure across Texas, leaving 4.5 million without power and many with no way to heat their homes. These blackouts were inequitably distributed: populations of color were four times more likely to lose power (Carvallo et al., 2021). The storm led to 246 confirmed deaths across the state, including from cold exposure and hypothermia, loss of power for life-sustaining medical equipment, carbon monoxide poisoning from people trying to warm homes with grills and other inappropriate equipment, fires from heating equipment, and slips and falls (TXDSHS, 2021). The Texas freeze and Winter Storm Uri resulted in an estimated $130 billion in property damage and other economic losses, including more than $600 million in agriculture losses alone (Dexheimer & Blackman, 2022).

Intense rainfall and storms contribute to significant inland and coastal flooding, inundating roadways, buildings, and farmland. First Street Foundation estimates that 6 million buildings nationwide collectively face an estimated $20 billion in annual flood losses; climate change is expected to increase this risk to $34 billion by 2051 (First Street Foundation, 2021). Other estimates put the current damage higher at $32 billion per year, rising to $40.6 billion in 2050 (Wing et al., 2022). 2021 flood risks are shown in **Figure 15**.

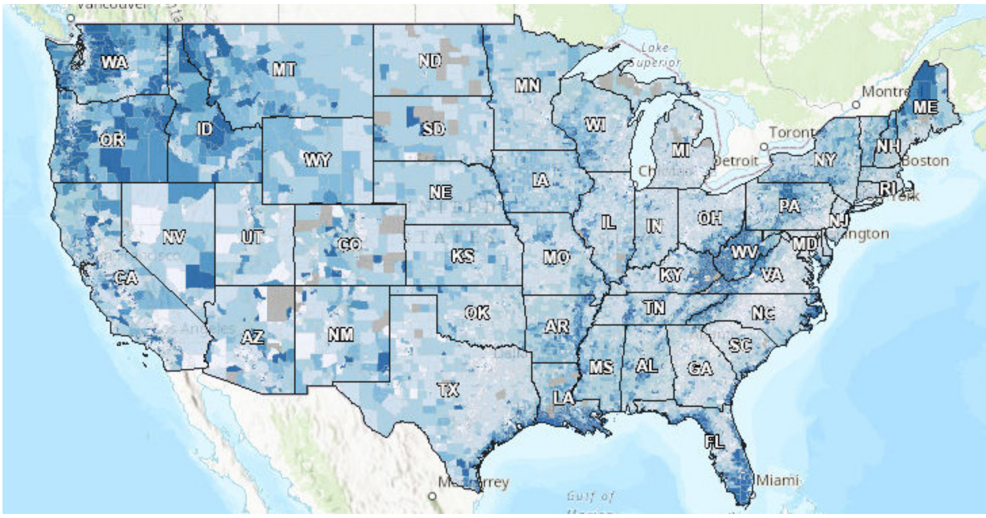
Flood insurance coverage is falling short, however: the National Flood Insurance Program was $20.5 billion in debt in 2021 (Horn & Webel, 2022). Not all at-risk homes are currently covered: First Street estimates that insurance rates would need to nearly quintuple to cover all homes currently at risk and increase by more than seven-fold to cover climate risks by 2051 (First Street Foundation, 2021). Similar to the challenges some households face in obtaining fire insurance, there is a risk that “blue-lining” will lead to the denial of flood insurance to those with high climate risk (Berman, 2019). Populations such as low-income communities, communities of color, and renters also face barriers to insurance such as damage thresholds for insurance payouts. These barriers, compounded by historic disinvestment and practices such as redlining, may put these populations at greater risk (Gauthier, 2021).

Flooding has also had significant impacts on agriculture, particularly throughout the Midwest: North Dakota, for example, has seen the largest impacts from flooding as a percentage of gross state product (NOAA, 2022). The U.S. Crop Insurance Program paid out $39 billion from 1995 to 2020 to cover agriculture damage due to rainfall and flooding (EWG, 2022).

Table 2 // Top 10 cities for estimated 2021 flood loss and projected *increase* in flood loss by 2050 (data source: First Street Foundation, 2021).

Cities with greatest 2021 flood loss (total $)			Cities with greatest projected growth in flood loss (2021-2050)	
City	**State**	**($ Millions)**	**City**	**State**
Fort Lauderdale	Florida	$569.99	Prien	Louisiana
Miami Beach	Florida	$509.11	Bayou Cane	Louisiana
St. Petersburg	Florida	$356.75	Raceland	Louisiana
Tampa	Florida	$332.98	Bayou Blue	Louisiana
Charleston	South Carolina	$300.03	Lake Charles	Louisiana
Port Charlotte	Florida	$283.63	Houma	Louisiana
Cape Coral	Florida	$245.30	Redwood City	California
Hollywood	Florida	$240.97	Oakley	California
Malibu	California	$237.07	Orange	California
New York	New York	$234.40	Shady Side	Maryland

Figure 15 // Relative flood risk to buildings across the United States, by census tract, 2021
(image source: First Street Foundation, 2022).



3.4 Extreme Heat

As climate change increases average temperatures, heat waves have also intensified in recent years (NOAA/NCEI/CEI, 2022). Extreme temperatures pose a higher risk to the elderly, children, unhoused populations, those with insufficient access to air conditioning, and outdoor workers. Health risks include heat stroke, cardiovascular impacts, respiratory disease, ozone formation, and adverse birth outcomes, among others (Ebi et al., 2021). Structural inequities can contribute to increased exposure to extreme heat. For example, historically redlined neighborhoods are still home to disproportionately low-income communities and communities of color and are more likely to be urban heat islands (Plumer & Popovich, 2020, Hoffman et al., 2020) with less greenspace today (Nardone et al., 2021) than wealthier, Whiter communities nearby. These households may also have lower ability to afford air conditioning. The U.S. Global Change Research Program

Table 3 // Top 10 counties for extreme heat by 2040
(data source: USGCRP, 2022).

County	State
Brooks	Texas
Dimmit	Texas
Duval	Texas
Luna	New Mexico
Zavala	Texas
Presidio	Texas
Imperial	California
Evangeline Parish	Louisiana
Chicot	Arkansas
Washington Parish	Louisiana

// Outdoor Workers

Outdoor workers, including farm labor and construction workers, are particularly vulnerable to the impacts of extreme heat. An estimated 32 million workers currently work outside in the United States. These workers are disproportionately male (83 percent) and Hispanic or Latino (29 percent). Outdoor worker exposure to extreme heat is expected to increase by a factor of 3-4 by 2050 and 14 million would face unsafe working days due to heat exposure under a moderate warming scenario. This extreme heat would threaten $39 billion in annual earnings in 2050 (Licker, 2022).

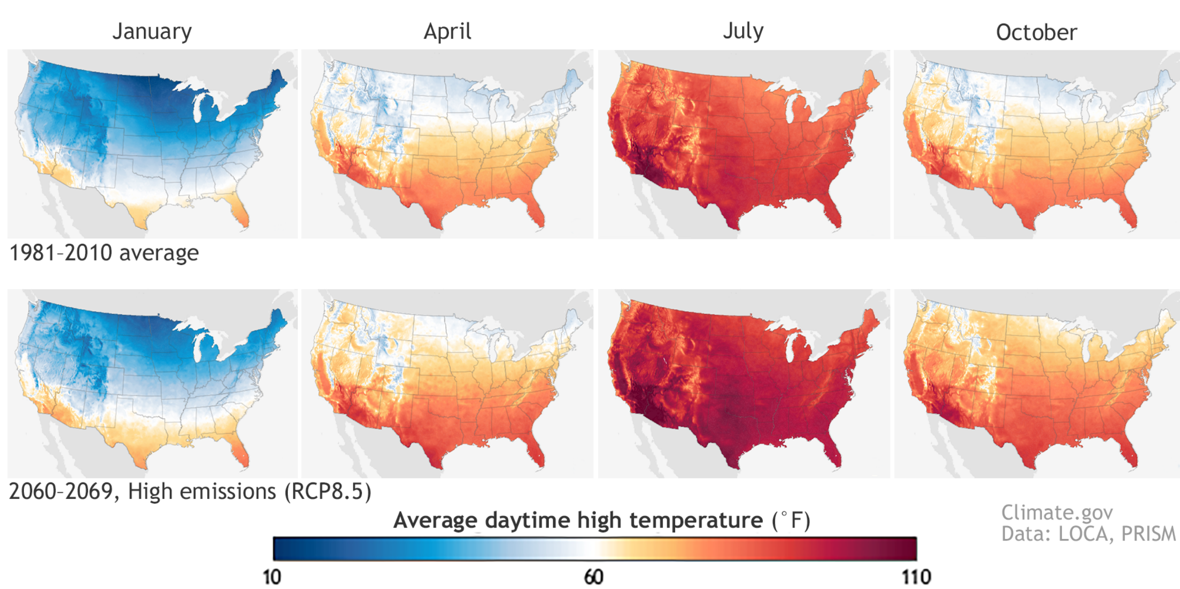
Table 4 // Top ten states for annual workdays at risk from extreme heat by 2050 (data source: Licker, 2022).

State	Annual workdays at risk (slow action)	Annual workdays at risk (no action)	Annual earnings at risk per worker (slow action)
Louisiana	26	34	$3,601
Florida	23	33	$2,648
Mississippi	21	28	$2,505
Arkansas	21	27	$2,481
Texas	20	27	$2,687
Oklahoma	20	27	$2,649
Alabama	15	22	$1,899
Georgia	15	21	$1,710
South Carolina	14	20	$1,592
Missouri	13	19	$1,653

has looked at a combination of where climate hazards pose the most risk to vulnerable populations by assessing where extreme heat aligns with vulnerable populations based on a mix of factors related to socioeconomic status, household composition and disability, race and language, and housing and transportation (USGCRP, 2022). The top 10 counties for extreme heat, based on projections for the year 2040, are shown in **Table 3** (from USGCRP, 2022). The top 10 states with the highest number of annual workdays at risk due to climate change in mid-century, assuming slow or no climate action, is shown in **Table 4** (from Licker et al., 2022).

Extreme heat has been on the rise across the country. In the summer of 2021, temperatures broke records across the Pacific Northwest. Seattle reached 108 °F and saw at least 100 heat-related deaths (WDOH, 2021). Researchers

Figure 16 // Historic and projected average daytime high temperatures under a high emissions scenario (image source: NOAA/Climate.gov).



suggest that this heat would normally occur only once every thousand years without climate change, but may occur every 5 to 10 years with 2 ˚C of warming (Philip et al., 2021). About eight percent of weather stations across the United States measured record highs in 2021 (Wallace, 2022). Recent research suggests that 37 percent of global heat-related deaths from 1991 to 2018 were attributable to global warming (Vicedo-Cabrera et al., 2021). While 700 deaths per year are directly linked to extreme heat in the United States (CDC, 2022), models suggest that heat may actually be responsible for 3,700 to 12,000 excess deaths per year (Khatana et al., 2022) and this number may rise to 36,000 by 2100 under a moderate warming scenario (Shindell et al., 2020). Average daytime high temperatures under a high warming scenario in the 2060s are shown in **Figure 16.**

Climate-driven temperature increases contribute to labor-related economic losses, particularly for outdoor industries and manufacturing, which resulted in an estimated labor supply loss of $1.7 billion per year from 2006 to 2016—an impact modeled to rise to $51 billion-$119 billion by the end of the century with no climate action (Zhang & Shindell, 2021).

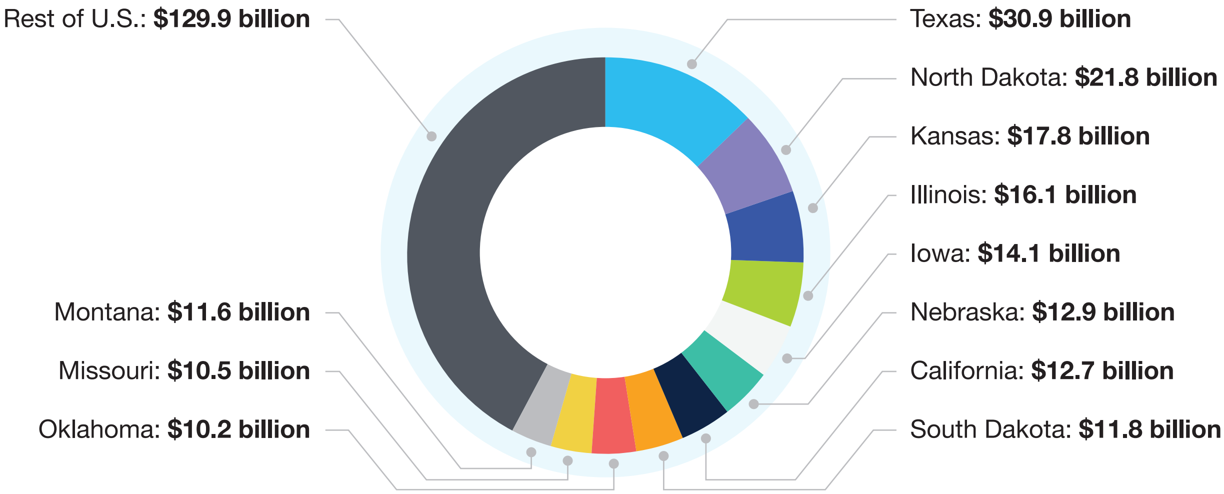
In addition to extreme heat, heat and humidity combine to create even deadlier conditions. Wet-bulb temperature is a metric of this combination, indicating the lowest temperature to which air can be cooled by evaporation. Importantly, high wet-bulb temperature puts a limit on the cooling capacity of human's natural defense mechanism against heat: sweat. When wet-bulb temperatures exceed 79 ˚F (26 ˚C), evaporative cooling cannot maintain appropriate body temperature; humans become very uncomfortable, and have an increased likelihood of health impacts (Stevens, 2020). Above 95 ˚F (35 ˚C) wet-bulb, human physiology cannot adapt. In coastal subtropical locations, 95 ˚F wet-bulb temperatures have already been recorded, and since 1979 the overall frequency of extreme humidity and heat events has doubled (Raymond et al., 2020). Outdoor workers and populations without access to air conditioning face the highest risk, especially in the Southeastern coastal states and in California's southern Central Valley. The economic risks of extreme heat extend past workers and businesses. In June 2022, a devastating heatwave killed more than 2,000 cows—worth an estimated $4 million—in southwest Kansas (Adamson, 2022). That same month, track temperatures of 140 ˚F contributed to the derailment of a Bay Area Rapid Transit train near Concord, California, causing dozens of passengers to be evacuated (Alvarez, 2022).

// Risks to Agriculture

Drought, wildfire, freezes, storms, and flooding all pose a risk to the agricultural sector, both directly and indirectly. Crops and rangeland lost an estimated $12.5 billion from climate and weather disasters in 2021, with the largest impacts from drought and wildfires; only half of these losses were covered by the federal crop insurance program. North Dakota alone lost $2.4 billion, largely from drought (Munch, 2022). The U.S. crop insurance program paid out $140 billion between 1991 and 2017, 19 percent of which was attributable to long-term warming (Diffenbaugh et al., 2021). Thirty-four percent of payouts from 1995 to 2020 were for drought and another 27 percent for excessive moisture. Indemnities paid to farmers by the federal crop insurance program in the 2010s were more than double those from the decade prior (EWG, 2022). Climate impacts on agriculture can take many additional forms: in 2018, Hurricane Florence killed 5,500 pigs and more than 3 million chickens and turkeys in North Carolina, while more than 100 hog lagoons released or were at risk of flooding and releasing contaminated water into the surrounding region (Pierre, 2018).

Agricultural yields are projected to fall by an average of 12 percent by 2080 to 2090 (NOAA, 2022). Projected losses are expected to be highest in the Southwest, South, Midwest, and East Coast, although the Pacific Northwest and Rockies are projected to see a reduction in overall damage to agriculture (NOAA, 2022) and the growing season may lengthen (NASA, 2022). Crop insurance premium subsidies are expected to grow 3.5 to 22 percent per year by 2080 (Crane-Droesch et al., 2019). Extreme heat also poses a threat to farmworkers, as described previously.

Figure 17 // Share of drought damage 1980-mid 2022 billion-dollar disaster costs (CPI-adjusted)
(data source: NOAA, 2022).

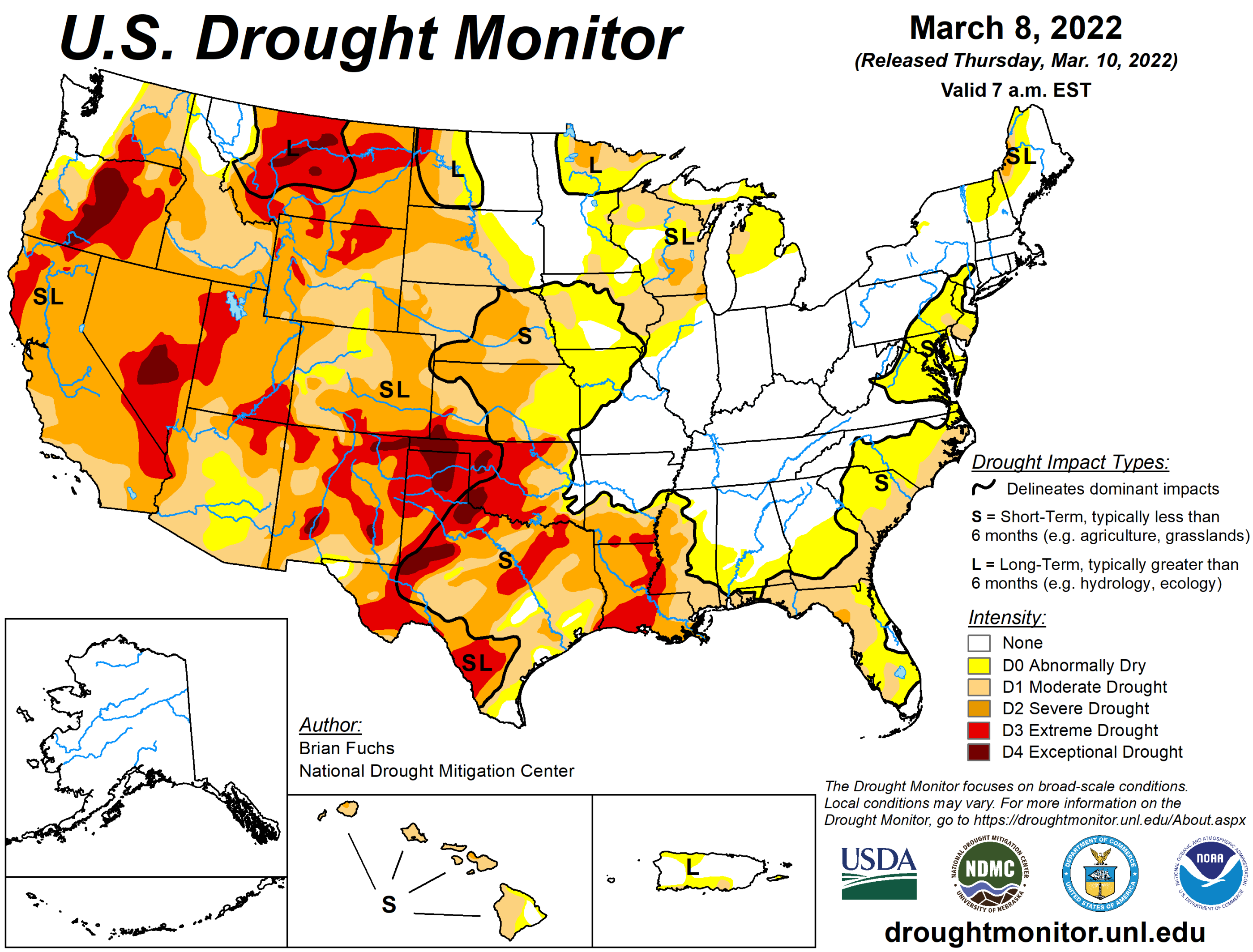


3.5 Drought

Rising temperatures, changing rainfall patterns, and early-season melting of the snowpack can all contribute to drought conditions. Drought has caused $291 billion in billion-dollar disaster losses since 1980 (NOAA, 2022). August 2021 broke records with 26 percent of the United States in extreme or exceptional drought. March of 2022 saw the highest overall drought levels since 2012 and the second-highest since 2000 (see **Figure 17**). Drought losses by state are shown in **Figure 16**.

Drought is expected to continue to increase in severity and frequency with climate change (Bates, 2021) and can exacerbate other climate risks, such as wildfires. Droughts can have devastating effects on agriculture and impact outdoor recreation businesses by reducing snowfall during ski season and affecting fishing, rafting, and other water activities (Crowley et al., 2019). Participation in outdoor recreation, which contributed $370 billion to GDP in 2020 (BEA, 2021), is further threatened by extreme heat and wildfire smoke (Dolesh, 2017). In 2021 alone, drought in California cost an estimated $1.2 billion in agriculture impacts and 8,745 full and part-time jobs (Medellín-Azuara et al., 2022). California's snowpack stood at 37 percent of normal on April 1, 2022, threatening to prolong drought impacts across the state (CADWR, 2022). Meanwhile, the Colorado River Basin had the driest 22-year period on record from 2000 from 2021. Lake Mead and Lake Powell hit historic lows in 2021, threatening agriculture and the ability to generate hydropower from the Glen Canyon Dam (Trujillo, 2021).

Figure 18 // On March 8, 2022, 61 percent of the United States was in drought, nearly reaching the 2012 high of 65 percent (image source: U.S. Drought Monitor, 2022).



4. Conclusion: Economic Costs and Solutions

As the economic costs of climate change escalate, so do the economic opportunities associated with climate action. Solar and wind energy are now the cheapest sources of new electricity generation in most parts of the country (Lazard, 2021). Thirty states and Washington D.C. have set renewable portfolio standards (Barbose, 2021), and 74 percent of new electric generating capacity in the U.S. in 2022 is expected to come from solar, wind, and batteries (Fasching & Ray, 2022). Major corporations are increasing the use of clean energy to power their operations—from data centers to transportation—and setting targets to slash emissions and go carbon neutral in the coming decades. Many have already entered renewable power purchase agreements covering 100 percent of their electricity demand, and three of the 10 largest banks have reached 100 percent renewables. These arrangements are financially beneficial, locking in low electricity prices for years (Butler, 2020).

Simultaneously, energy efficiency measures remain a cheaper alternative to generating electricity from any resource (Hoffman et al., 2018). From adopting LED light bulbs to replacing HVAC systems and water heaters with high-efficiency air source heat pumps, these investments provide bill savings for consumers and businesses and reduce costs for utilities (Schwartz et al., 2021).

Every automaker is rapidly adding electric vehicles to their offerings, including SUVs and trucks (Preston & Bartlett, 2022). In the United States, sales of electric vehicles increased by 66 percent between Q2 2021 and Q2 2022, in spite of supply chain challenges (Cox Automotive, 2022). This transition provides consumers with savings on rising gas prices, as well as on maintenance costs, which for electric vehicles are 40 percent lower than for internal combustion engines (Burnham et al., 2021).

As these industries grow, so do jobs. Clean energy now employs approximately 3.2 million workers (E2, 2021) and median hourly wages at these clean jobs are 25 percent higher than the national median (E2 et al., 2020). This workforce is expected to expand with increasing vehicle and building electrification and the growth of renewable energy, as well as investments in infrastructure to build resilience to future weather and climate disasters.

Despite their importance, these market trends and climate policies are insufficient to avoid catastrophic climate impacts. A concerted effort across the public and private sectors is required to avert trillions of dollars in economic damages in the coming decades. Over the next few years, climate policies must rapidly reverse the growth in greenhouse gas emissions and scale clean energy technologies.

Policies Matter

In August 2022, President Biden signed the most far-reaching climate policy in history, the Inflation Reduction Act (IRA). The law includes a record $370 billion for clean energy investments, tax credits, and programs that are designed to reduce greenhouse gas emissions by 40 percent below 2005 levels by 2030. In turn, these emission reductions are expected to help mitigate climate and weather disasters and their devastating economic costs.

The IRA investments include 30 percent tax credits for renewable energy and battery storage for 10 years and other tax credits for new and used electric vehicles. The law also creates a $27 billion Greenhouse Gas Reduction Fund that will provide grants to nonprofit organizations and state and local governments to advance clean energy and zero-emission technologies, including funding targeted at under-resourced and low-income communities and communities of color. In addition, the IRA dramatically increases the size and scope of the Department of Energy's Loan Programs Office that funds early stage clean energy and clean transportation companies. Together, these investments are expected to reduce the social costs of climate change—including costs from climate disasters, heat-related issues and health impacts—by $1.9 trillion by 2050, according to the federal Office of Management and Budget (OMB, 2022). Estimates suggest these investments could create 9 million new clean energy jobs (BlueGreen Alliance, 2022) and drive an estimated $467 billion in economic activity over the next 15 years (NRDC, 2022).

The IRA is just one federal policy reducing the economic costs of climate change and expanding the economic benefits of clean energy and clean transportation. In

November 2021, President Biden signed the Infrastructure Investment and Jobs Act (IIJA) which calls for tens of billions in climate-focused investments, including investments in clean energy transmission ($65 billion), electric vehicle infrastructure ($7.5 billion), and electric buses ($5 billion). These investments also are expected to create jobs and drive private-sector growth while reducing climate disaster-causing emissions. In addition to the bipartisan infrastructure bill and the Inflation Reduction Act, Congress passed the CHIPS and Science Act of 2022, which also promises to spur clean energy growth by authorizing $280 billion in investments in the U.S. semiconductor industry, ultimately supporting the production of everything from smart appliances to electric vehicles.

At the same time, state and local governments are enacting policies that improve the economics of climate action. Twenty-one states (plus the District of Columbia and Puerto Rico) have adopted 100 percent clean energy goals as of late 2022, according to the Clean Energy States Alliance (CESA, 2022). Additionally, numerous states, led by California, enacted policies in 2022 that will require all new car sales to be zero-emission by 2035 (CARB, 2022). Other states and municipalities are working on sweeping new regulations that would reduce emissions from buildings, agriculture, and other major sources.

These federal and state policies are a critical first step to reduce the economic costs of climate change and expand the economic benefits of clean energy, including to under-resourced communities and communities of color. The current federal investments are expected to achieve a 40 percent reduction in emissions by 2030, but additional investments will be needed to decarbonize the economy by 2050.

Rolling back, not fully funding, or reducing the efficacy of federal climate investments risk billions of dollars of economic growth, millions of jobs, billions in lost wages, and would undermine the country's ability to meet these climate targets and protect the economy from climate impacts. The implementation of this funding in the coming years will also hold implications for who receives the benefits of the clean energy transition. Strategic allocation of these investments can increase economic benefits for those with the greatest need. For instance, policies that expand clean energy in low-income neighborhoods can help offset government-funded bill assistance programs—resulting in greater cost savings for all taxpayers. But unlocking these benefits requires effective outreach to achieve meaningful participation from communities.

Federal and state agencies must have the proper resources to handle this major influx in funding and must ensure that they are equitably distributed so that all Americans in every part of the economy benefit from the transition to a cleaner economy. The private and public sector need to continue to pursue additional opportunities to reduce emissions beyond the IRA in order to speed the transition to a climate-smart economy.

The cost of inaction is unacceptable, but climate action gives us an incredible opportunity. With significant and equitable up-front investment, we can reshape our economy to mitigate climate change and build climate resilience while creating jobs and protecting our most vulnerable populations.

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Appendix 1: Historic Billion-Dollar Climate and Weather Damages by State

Data are derived from the NOAA Billion Dollar Climate Database. $ are CPI-adjusted. Data updated July 11, 2022. These disasters include drought, flooding, freezes, severe storms, tropical cyclones, wildfires, and winter storms. Billion-dollar disaster damage is estimated to reflect more than 80 percent of all weather and climate damage across the United States, so these figures do not reflect the full economic toll that includes sub-billion dollar disasters.

*Data for Hawaii and Alaska can be particularly limited due to their remoteness from other states and territories, meaning only disasters that cause a billion dollars in damage in Hawaii or Alaska alone would be calculated.

Historic Billion-Dollar Weather and Climate Losses by State (CPI-Adjusted), 1980–July 2022

State	Total Losses ($Millions)	Drought ($Millions)	Flooding ($Millions)	Freeze ($Millions)	Severe Storm ($Millions)	Tropical Cyclone ($Millions)	Wildfire ($Millions)	Winter Storm ($Millions)
Alaska*	$2,095	$0	$0	$0	$0	$0	$2,095	$0
Alabama	$46,830	$6,371	$127	$141	$12,365	$25,072	$678	$2,076
Arkansas	$19,378	$6,161	$4,359	$276	$7,015	$668	$0	$899
Arizona	$8,013	$1,084	$620	$0	$5,092	$0	$1,216	$0
California	$135,032	$12,719	$13,411	$14,327	$3,261	$0	$91,315	$0
Colorado	$37,379	$5,440	$1,928	$97	$23,078	$0	$6,709	$128
Connecticut	$9,292	$12	$304	$39	$723	$5,569	$0	$2,645
Delaware	$2,823	$823	$22	$12	$175	$960	$0	$832
Florida	$257,206	$1,419	$1,563	$12,877	$4,048	$233,297	$284	$3,719
Georgia	$38,696	$7,689	$1,295	$1,214	$9,075	$17,322	$273	$1,828
Hawaii*	$6,417	$0	$0	$0	$0	$6,417	$0	$0
Iowa	$55,067	$14,102	$22,644	$72	$18,122	$0	$0	$127
Idaho	$6,714	$3,070	$544	$12	$0	$0	$3,088	$0
Illinois	$46,906	$16,052	$9,184	$399	$18,553	$964	$0	$1,754
Indiana	$25,941	$8,154	$5,115	$217	$10,919	$983	$0	$554
Kansas	$32,182	$17,757	$3,393	$163	$10,792	$0	$0	$76
Kentucky	$21,841	$7,205	$252	$236	$11,638	$1,225	$0	$1,284
Louisiana	$287,440	$4,881	$19,917	$194	$10,536	$249,812	$0	$2,100
Massachusetts	$8,424	$19	$311	$47	$564	$3,419	$0	$4,067
Maryland	$14,657	$3,145	$254	$31	$2,683	$5,974	$0	$2,571
Maine	$1,679	$12	$0	$0	$192	$133	$0	$1,342
Michigan	$10,161	$3,059	$2,007	$47	$4,638	$0	$0	$411
Minnesota	$31,291	$8,594	$5,276	$51	$17,118	$0	$93	$159
Missouri	$47,453	$10,498	$14,283	$606	$21,097	$471	$0	$498
Mississippi	$78,458	$8,006	$3,481	$120	$5,169	$57,372	$40	$4,272
Montana	$16,182	$11,603	$332	$12	$1,075	$0	$3,161	$0

Historic Billion-Dollar Weather and Climate Losses by State (CPI-Adjusted), 1980–July 2022								
State	**Total Losses ($Millions)**	**Drought ($Millions)**	**Flooding ($Millions)**	**Freeze ($Millions)**	**Severe Storm ($Millions)**	**Tropical Cyclone ($Millions)**	**Wildfire ($Millions)**	**Winter Storm ($Millions)**
North Carolina	$81,549	$9,706	$62	$289	$6,491	$62,984	$84	$1,934
North Dakota	$31,014	$21,840	$9,037	$12	$77	$0	$12	$36
Nebraska	$29,014	$12,898	$4,854	$81	$11,128	$0	$54	$0
New Hampshire	$1,941	$12	$0	$0	$152	$429	$0	$1,348
New Jersey	$59,066	$465	$1,094	$47	$3,197	$49,355	$0	$4,909
New Mexico	$5,276	$2,660	$0	$0	$859	$283	$1,474	$0
Nevada	$2,659	$393	$1,012	$0	$58	$0	$1,154	$42
New York	$75,439	$586	$1,896	$66	$3,317	$63,521	$0	$6,054
Ohio	$24,718	$5,934	$1,169	$387	$12,918	$3,119	$0	$1,191
Oklahoma	$35,568	$10,229	$2,406	$582	$21,147	$0	$323	$881
Oregon	$11,043	$3,563	$1,535	$128	$99	$0	$5,301	$416
Pennsylvania	$24,880	$2,337	$1,098	$97	$7,133	$10,952	$0	$3,262
Puerto Rico	$114,927	$0	$0	$0	$0	$114,927	$0	$0
Rhode Island	$2,503	$12	$165	$8	$151	$1,257	$0	$910
South Carolina	$33,484	$4,021	$2,339	$602	$4,028	$21,265	$0	$1,228
South Dakota	$18,249	$11,789	$5,138	$23	$1,199	$0	$100	$0
Tennessee	$33,905	$6,665	$3,693	$181	$18,616	$1,222	$1,694	$1,835
Texas	$361,076	$30,893	$14,173	$523	$65,162	$224,114	$2,927	$23,285
Utah	$3,304	$473	$1,490	$12	$27	$0	$1,303	$0
Virginia	$21,906	$4,397	$2,054	$85	$2,964	$9,831	$0	$2,574
Virgin Islands	$19,586	$0	$0	$0	$0	$19,586	$0	$0
Vermont	$2,253	$12	$0	$0	$146	$1,089	$0	$1,006
Washington	$7,527	$3,429	$1,019	$105	$64	$0	$2,738	$172
Wisconsin	$17,713	$5,362	$5,772	$47	$6,405	$0	$0	$127
West Virginia	$7,194	$2,156	$2,638	$65	$801	$775	$0	$760
Wyoming	$4,577	$2,569	$0	$8	$975	$0	$1,025	$0
United States	**$2,277,927**	**$300,276**	**$173,265**	**$34,534**	**$365,037**	**$1,194,365**	**$127,142**	**$83,308**

Appendix 2: Last 5 Years: Billion-Dollar Disasters Cost by State

Data are derived from the NOAA Billion Dollar Climate Database. $ are CPI-adjusted. Data updated July 11, 2022. These disasters include drought, flooding, freezes, severe storms, tropical cyclones, wildfires, and winter storms. Billion-dollar disaster damage is estimated to reflect more than 80 percent of all weather and climate damage across the United States, so these figures do not reflect the full economic toll that includes sub-billion dollar disasters.

*Data for Hawaii and Alaska can be particularly limited due to their remoteness from other states and territories, meaning only disasters that cause a billion dollars in damage in Hawaii or Alaska alone would be calculated.

Last 5 Years: Billion-Dollar Disasters Cost (in $Millions) by State (CPI-Adjusted), 2017-2021

State	2021 Disaster Total Losses ($Millions)	Percent of Loss in 2021 Disasters	2017–2021 Total Disaster Losses ($Millions)	Average Annual Disaster Losses 2017–2021 ($Millions)	Percent of Historic Billion-Dollar Disaster Loss 2017–2021 (Proportionate = 12%)
Alaska*	$0	0.0%	$457	$91	21.8%
Alabama	$609	1.3%	$9,600	$1,920	20.5%
Arkansas	$620	3.2%	$4,689	$938	24.2%
Arizona	$489	6.1%	$697	$139	8.7%
California	$7,832	5.8%	$73,188	$14,638	54.2%
Colorado	$4,112	11.00%	$16,447	$3,289	44.0%
Connecticut	$1,013	10.9%	$2,416	$483	26.0%
Delaware	$54	1.9%	$296	$59	10.5%
Florida	$514	0.2%	$71,760	$14,352	27.9%
Georgia	$890	2.3%	$13,195	$2,639	34.1%
Hawaii*	$0	0.0%	$0	$0	0.0%
Iowa	$1,156	2.1%	$16,300	$3,260	29.6%
Idaho	$698	10.4%	$1,282	$256	19.1%
Illinois	$1,548	3.3%	$9,428	$1,886	20.1%
Indiana	$1,245	4.8%	$3,658	$732	14.1%
Kansas	$515	1.6%	$4,087	$817	12.7%
Kentucky	$3,080	14.1%	$4,172	$834	19.1%
Louisiana	$56,626	19.7%	$87,094	$17,419	30.3%
Massachusetts	$270	3.2%	$1,238	$248	14.7%
Maryland	$366	2.5%	$2,037	$407	13.9%
Maine	$0	0.0%	$24	$5	1.4%
Michigan	$1,260	12.4%	$3,170	$634	31.2%
Minnesota	$1,346	4.30%	$6,258	$1,252	20.0%
Missouri	$854	1.80%	$7,023	$1,405	14.8%

Last 5 Years: Billion-Dollar Disasters Cost (in $Millions) by State (CPI-Adjusted), 2017-2021					
State	**2021 Disaster Total Losses ($Millions)**	**Percent of Loss in 2021 Disasters**	**2017–2021 Total Disaster Losses ($Millions)**	**Average Annual Disaster Losses 2017–2021 ($Millions)**	**Percent of Historic Billion-Dollar Disaster Loss 2017–2021 (Proportionate = 12%)**
Mississippi	$942	1.2%	$4,315	$863	5.5%
Montana	$1,295	8%	$3,673	$735	22.7%
North Carolina	$734	0.9%	$31,641	$6,328	38.8%
North Dakota	$2,574	8.3%	$4,745	$949	15.3%
Nebraska	$522	1.8%	$6,992	$1,398	24.1%
New Hampshire	$0	0%	$23	$5	1.2%
New Jersey	$9,923	16.8%	$11,754	$2,351	19.9%
New Mexico	$401	7.6%	$770	$154	14.6%
Nevada	$141	5.30%	$417	$83	15.7%
New York	$10,561	14.0%	$13,202	$2,640	17.5%
Ohio	$766	3.1%	$4,869	$974	19.7%
Oklahoma	$1,814	5.1%	$6,153	$1,231	17.3%
Oregon	$1,270	11.5%	$4,693	$939	42.5%
Pennsylvania	$2,762	11.1%	$6,344	$1,269	25.5%
Puerto Rico	$0	0.0%	$106,192	$21,238	92.4%
Rhode Island	$75	3.0%	$298	$60	11.9%
South Carolina	$268	0.8%	$4,755	$951	14.2%
South Dakota	$1,113	6.1%	$4,343	$869	23.8%
Tennessee	$1,797	5.3%	$7,018	$1,404	20.7%
Texas	$27,442	7.60%	$202,564	$40,513	56.1%
Utah	$129	3.9%	$889	$178	26.9%
Virginia	$526	2.40%	$3,373	$675	15.4%
Virgin Islands	$0	0%	$13,397	$2,679	68.4%
Vermont	$0	0.0%	$14	$3	0.6%
Washington	$1,415	18.8%	$2,604	$521	34.6%
Wisconsin	$478	2.7%	$3,808	$762	21.5%
West Virginia	$29	0.4%	$259	$52	3.6%
Wyoming	$311	6.8%	$1,121	$224	24.5%

Appendix 3: Top 100 Counties for Expected Weather and Climate Losses to Buildings, Agriculture, and Human Life

Data are from FEMA's National Risk Index, and reflect selected climate risks and weather risks (coastal flooding, cold wave, drought, hail, heat wave, hurricane, ice storm, riverine flooding, strong wind, tornado, wildfire, winter weather). The Community Resilience Index reflects the "ability to prepare for anticipated natural hazards, adapt to changing conditions, and withstand and recover rapidly from disruptions" and the Social Vulnerability Index reflects a county's "susceptibility to the adverse impacts of natural hazards" (Federal Emergency Management Agency, 2021). In addition, data reflects average historic losses from 1996-2019, but these values have grown in recent years (see **Appendix 1**). For both of these reasons, future losses are expected to be significantly higher than reported here.

Data for Hawaii and Alaska are also missing for certain disasters, meaning some counties in these states may be very high risk but may not be listed here.

*Expected annual loss is calculated only for impact to buildings, agriculture, and loss of human life. It does not reflect additional infrastructure losses.

Top 100 Counties: Climate and Weather Damage Loss Risk

County	State	Expected Annual Loss ($)*	Population	Social Vulnerability Index (National Percentile)	Community Resilience Index (National Percentile)
Harris	Texas	$1,179,985,998	4,092,459	53	21
Galveston	Texas	$332,714,860	291,309	23	67
Ocean	New Jersey	$288,341,170	576,567	53	80
Fort Bend	Texas	$271,420,790	585,375	2	54
Santa Barbara	California	$256,023,487	423,895	54	55
Orleans	Louisiana	$218,031,470	343,829	86	96
Collin	Texas	$193,249,933	782,341	2	36
Palm Beach	Florida	$191,631,736	1,320,134	86	20
Montgomery	Texas	$187,327,526	455,746	6	26
Brazoria	Texas	$185,002,055	313,166	8	62
Shelby	Tennessee	$174,592,911	927,644	47	57
San Diego	California	$166,692,809	3,095,313	26	15
Cook	Illinois	$165,956,465	5,194,675	70	51
Miami-Dade	Florida	$150,590,486	2,496,435	98	34
Riverside	California	$149,765,550	2,189,641	59	15
Dallas	Texas	$145,536,491	2,368,139	69	27
St. Louis	Missouri	$129,719,679	998,954	26	66
Tarrant	Texas	$128,281,489	1,809,034	30	35
Yolo	California	$117,393,101	200,849	33	49

Top 100 Counties: Climate and Weather Damage Loss Risk

County	State	Expected Annual Loss ($)*	Population	Social Vulnerability Index (National Percentile)	Community Resilience Index (National Percentile)
Mobile	Alabama	$108,630,945	412,992	49	64
Jefferson	Texas	$107,398,517	252,273	65	63
Bexar	Texas	$105,746,859	1,714,773	81	49
Lee	Florida	$105,376,843	618,754	94	24
Sonoma	California	$103,284,271	483,878	35	44
East Baton Rouge	Louisiana	$101,044,533	440,171	32	91
St. Tammany	Louisiana	$97,635,693	233,740	10	96
Denton	Texas	$96,857,757	662,614	4	34
Oklahoma	Oklahoma	$94,753,382	718,633	53	63
King	Washington	$93,688,130	1,931,249	6	36
Napa	California	$91,127,606	136,484	40	48
Sacramento	California	$90,490,906	1,418,788	55	51
San Bernardino	California	$86,912,535	2,035,210	59	30
St. Lucie	Florida	$86,408,709	277,789	91	44
Travis	Texas	$84,734,321	1,024,266	15	34
Sutter	California	$82,757,361	94,737	66	60
Butte	California	$82,473,503	220,000	66	46
Los Angeles	California	$81,583,050	9,818,605	77	18
Bergen	New Jersey	$80,970,828	905,116	9	60
Harrison	Mississippi	$78,884,408	187,105	58	63
Tulsa	Oklahoma	$76,747,795	603,403	44	53
Davidson	Tennessee	$76,715,059	626,681	39	57
Jefferson	Alabama	$75,413,902	658,466	44	72
Wayne	Michigan	$71,971,209	1,820,584	81	54
Grays Harbor	Washington	$71,551,855	72,797	82	33
Colusa	California	$71,244,823	21,419	74	31
Volusia	Florida	$69,846,014	494,593	88	42
Glenn	California	$66,766,460	28,122	78	22
Jefferson	Kentucky	$66,301,049	741,096	47	72
Jefferson	Colorado	$66,111,882	534,543	7	59
St. Louis	Missouri	$65,839,258	319,294	93	50
Douglas	Nebraska	$65,245,507	517,110	30	84
Jefferson	Louisiana	$64,680,710	432,552	60	98
Lubbock	Texas	$63,868,986	278,831	54	69

Top 100 Counties: Climate and Weather Damage Loss Risk					
County	**State**	**Expected Annual Loss ($)***	**Population**	**Social Vulnerability Index (National Percentile)**	**Community Resilience Index (National Percentile)**
New Hanover	North Carolina	$63,477,420	202,667	43	64
Lafayette	Louisiana	$63,406,179	221,578	18	63
Arapahoe	Colorado	$63,124,612	572,003	15	40
Orange	Texas	$61,863,755	81,837	19	72
Jackson	Mississippi	$60,740,372	139,668	30	72
Brevard	Florida	$60,368,186	543,376	68	54
Broward	Florida	$59,633,374	1,748,066	74	48
Escambia	Florida	$58,920,141	297,619	54	62
Pinal	Arizona	$58,827,245	375,770	46	9
Ventura	California	$58,779,999	823,318	19	51
Parmer	Texas	$57,213,370	10,269	73	31
Hennepin	Minnesota	$56,267,689	1,152,425	11	76
Jackson	Missouri	$54,758,376	674,158	60	70
Hudson	New Jersey	$54,426,033	634,266	93	27
Hillsborough	Florida	$54,134,239	1,229,226	49	48
Solano	California	$53,470,457	413,344	31	61
Orange	Florida	$52,372,635	1,145,956	58	38
Monmouth	New Jersey	$52,335,376	630,380	4	79
Sedgwick	Kansas	$52,077,693	498,365	30	77
Calcasieu	Louisiana	$51,798,287	192,768	34	84
Indian River	Florida	$51,743,722	138,028	94	33
Martin	Florida	$51,619,036	146,318	77	39
Clatsop	Oregon	$51,419,379	37,039	83	35
DuPage	Illinois	$50,472,528	916,924	3	64
Philadelphia	Pennsylvania	$50,374,986	1,526,006	97	59
Denver	Colorado	$50,115,893	600,158	39	41
Oakland	Michigan	$49,326,935	1,202,362	7	69
Atlantic	New Jersey	$47,427,230	274,549	92	77
Cameron	Texas	$47,409,953	406,220	99	20
Washington	Utah	$46,033,836	138,115	48	21
Seminole	Florida	$45,905,305	422,718	24	51
Somerset	New Jersey	$44,661,964	323,444	1	74
Linn	Iowa	$44,430,646	211,226	12	97
Lancaster	Nebraska	$43,690,743	285,407	19	95

Top 100 Counties: Climate and Weather Damage Loss Risk					
County	**State**	**Expected Annual Loss ($)***	**Population**	**Social Vulnerability Index (National Percentile)**	**Community Resilience Index (National Percentile)**
El Paso	Colorado	$43,641,057	622,263	11	41
Pulaski	Arkansas	$43,432,996	382,748	44	72
Livingston	Louisiana	$43,304,662	128,026	5	90
Kings	New York	$42,999,426	2,504,700	99	8
Washoe	Nevada	$42,935,857	421,407	55	24
Johnson	Kansas	$42,861,687	544,179	3	59
Franklin	Ohio	$42,844,240	1,163,414	26	73
Nueces	Texas	$42,622,326	340,223	90	75
Hamilton	Ohio	$42,287,541	802,374	53	80
Hinds	Mississippi	$42,235,571	245,285	75	76
Minnehaha	South Dakota	$41,958,630	169,468	22	95
Larimer	Colorado	$41,880,961	299,630	9	50
Johnson	Iowa	$40,092,677	130,882	8	73
Pinellas	Florida	$39,701,817	916,542	84	29

Appendix 4: Climate Risks by Legislative District

Data are from FEMA's National Risk Index, and reflect selected climate risks and weather risks (coastal flooding, cold wave, drought, hail, heat wave, hurricane, ice storm, riverine flooding, strong wind, tornado, wildfire, winter weather) (FEMA, 2022). Census tract level data was assigned to congressional districts maps (as of 2023) using Proximity One's equivalence tables (Proximity One, 2022) .

*Expected annual loss is calculated only for impact to buildings, agriculture, and loss of human life. It does not reflect additional infrastructure losses.

** Data for Hawaii and Alaska are missing for certain disasters, losses do not represent the full economic toll.

Expected Annual Loss by Congressional District (118th Congress) (data source: FEMA, 2022)

State	District	Representative	Total Weather and Climate (Expected Annual Loss, $)*	Largest Impact Event Type
Alabama	1	Rep. Carl	$123,885,423	Hurricane
Alabama	2	Rep. Moore	$66,502,144	Drought
Alabama	3	Rep. Rogers	$44,254,957	Tornado
Alabama	4	Rep. Aderholt	$70,797,884	Tornado
Alabama	5	Rep. Strong	$62,363,816	Tornado
Alabama	6	Rep. Palmer	$58,836,346	Tornado
Alabama	7	Rep. Sewell	$76,063,220	Tornado
Alaska**	At-Large	Rep. Peltola	$3,384,765	Riverine Flooding
Arizona	1	Rep. Schweikert	$11,445,292	Wildfire
Arizona	2	Rep. Crane	$122,250,184	Wildfire
Arizona	3	Rep. Gallego	$2,954,826	Riverine Flooding
Arizona	4	Rep. Stanton	$3,373,863	Strong Wind
Arizona	5	Rep. Biggs	$6,103,277	Drought
Arizona	6	Rep. Ciscomani	$69,395,153	Drought
Arizona	7	Rep. Grijalva	$25,452,879	Riverine Flooding
Arizona	8	Rep. Lesko	$5,354,095	Wildfire
Arizona	9	Rep. Gosar	$16,594,524	Riverine Flooding
Arkansas	1	Rep. Crawford	$133,678,775	Tornado
Arkansas	2	Rep. Hill	$95,045,022	Tornado
Arkansas	3	Rep. Womack	$65,769,847	Tornado
Arkansas	4	Rep. Westerman	$150,118,021	Drought
California	1	Rep. LaMalfa	$398,189,122	Drought
California	2	Rep. Huffman	$117,830,927	Drought
California	3	Rep. Kiley	$65,070,241	Drought
California	4	Rep. Thompson	$293,253,558	Drought
California	5	Rep. McClintock	$101,787,053	Drought
California	6	Rep. Bera	$13,279,862	Drought

Expected Annual Loss by Congressional District (118th Congress) (data source: FEMA, 2022)				
State	**District**	**Representative**	**Total Weather and Climate (Expected Annual Loss, $)***	**Largest Impact Event Type**
California	7	Rep. Matsui	$76,019,440	Drought
California	8	Rep. Garamendi	$15,925,026	Drought
California	9	Rep. Harder	$31,106,898	Drought
California	10	Rep. DeSaulnier	$19,373,918	Drought
California	11	Rep. Pelosi	$689,006	Tornado
California	12	Rep. Lee	$2,360,942	Riverine Flooding
California	13	Rep. Duarte	$88,393,259	Drought
California	14	Rep. Swalwell	$17,254,359	Drought
California	15	Rep. Mullin	$2,003,879	Riverine Flooding
California	16	Rep. Eshoo	$13,044,740	Wildfire
California	17	Rep. Khanna	$2,588,652	Riverine Flooding
California	18	Rep. Lofgren	$13,870,696	Drought
California	19	Rep. Panetta	$45,178,371	Wildfire
California	20	Rep. McCarthy	$28,887,823	Wildfire
California	21	Rep. Costa	$7,317,245	Riverine Flooding
California	22	Rep. Valadao	$23,844,028	Drought
California	23	Rep. Obernolte	$60,216,309	Wildfire
California	24	Rep. Carbajal	$276,974,876	Drought
California	25	Rep. Ruiz	$36,313,762	Wildfire
California	26	Rep. Brownley	$52,443,311	Riverine Flooding
California	27	Rep. Garcia	$32,966,734	Wildfire
California	28	Rep. Chu	$16,134,776	Wildfire
California	29	Rep. Cárdenas	$1,242,354	Wildfire
California	30	Rep. Schiff	$5,715,848	Wildfire
California	31	Rep. Napolitano	$3,099,756	Wildfire
California	32	Rep. Sherman	$21,493,183	Wildfire
California	33	Rep. Aguilar	$10,141,606	Riverine Flooding
California	34	Rep. Gomez	$769,462	Tornado
California	35	Rep. Torres	$6,059,157	Riverine Flooding
California	36	Rep. Lieu	$877,011	Tornado
California	37	Rep. Kamlager-Dove	$1,031,587	Riverine Flooding
California	38	Rep. Sánchez	$1,964,543	Wildfire
California	39	Rep. Takano	$14,585,400	Wildfire
California	40	Rep. Kim	$18,673,878	Wildfire
California	41	Rep. Calvert	$68,884,339	Wildfire
California	42	Rep. Garcia	$1,085,009	Tornado
California	43	Rep. Waters	$525,613	Tornado
California	44	Rep. Barragán	$619,048	Tornado
California	45	Rep. Steel	$2,670,456	Riverine Flooding
California	46	Rep. Correa	$1,330,662	Riverine Flooding
California	47	Rep. Porter	$5,600,460	Riverine Flooding
California	48	Rep. Issa	$165,205,428	Wildfire
California	49	Rep. Levin	$21,554,736	Wildfire

Expected Annual Loss by Congressional District (118th Congress) (data source: FEMA, 2022)				
State	**District**	**Representative**	**Total Weather and Climate (Expected Annual Loss, $)***	**Largest Impact Event Type**
California	50	Rep. Peters	$11,589,964	Wildfire
California	51	Rep. Jacobs	$3,407,898	Wildfire
California	52	Rep. Vargas	$2,300,311	Wildfire
Colorado	1	Rep. DeGette	$50,058,166	Hail
Colorado	2	Rep. Neguse	$68,664,964	Riverine Flooding
Colorado	3	Rep. Boebert	$30,356,190	Riverine Flooding
Colorado	4	Rep. Buck	$67,586,842	Tornado
Colorado	5	Rep. Lamborn	$36,486,018	Tornado
Colorado	6	Rep. Crow	$65,716,965	Hail
Colorado	7	Rep. Pettersen	$77,509,847	Hail
Colorado	8	Rep. Caraveo	$40,615,933	Hail
Connecticut	1	Rep. Larson	$10,276,582	Tornado
Connecticut	2	Rep. Courtney	$12,156,614	Riverine Flooding
Connecticut	3	Rep. DeLauro	$6,483,258	Tornado
Connecticut	4	Rep. Himes	$7,072,195	Strong Wind
Connecticut	5	Rep. Hayes	$11,910,564	Drought
Delaware	At-Large	Rep. Blunt Rochester	$31,563,950	Coastal Flooding
Florida	1	Rep. Gaetz	$80,503,812	Hurricane
Florida	2	Rep. Dunn	$113,691,682	Hurricane
Florida	3	Rep. Cammack	$54,505,531	Wildfire
Florida	4	Rep. Bean	$32,638,893	Hurricane
Florida	5	Rep. Rutherford	$41,677,145	Riverine Flooding
Florida	6	Rep. Waltz	$70,797,437	Hurricane
Florida	7	Rep. Mills	$79,568,295	Hurricane
Florida	8	Rep. Posey	$110,803,037	Hurricane
Florida	9	Rep. Soto	$33,418,584	Wildfire
Florida	10	Rep. Frost	$23,922,306	Tornado
Florida	11	Rep. Webster	$29,932,257	Tornado
Florida	12	Rep. Bilirakis	$38,222,000	Tornado
Florida	13	Rep. Luna	$25,716,124	Tornado
Florida	14	Rep. Castor	$26,353,958	Tornado
Florida	15	Rep. Lee	$25,729,865	Tornado
Florida	16	Rep. Buchanan	$31,390,125	Tornado
Florida	17	Rep. Steube	$59,726,323	Hurricane
Florida	18	Rep. Franklin	$80,238,454	Hurricane
Florida	19	Rep. Donalds	$92,724,833	Hurricane
Florida	20	Rep. Cherfilus-McCormick	$43,233,954	Hurricane
Florida	21	Rep. Mast	$182,042,754	Hurricane
Florida	22	Rep. Frankel	$79,316,890	Hurricane
Florida	23	Rep. Moskowitz	$42,821,436	Hurricane
Florida	24	Rep. Wilson	$45,773,662	Coastal Flooding
Florida	25	Rep. Wasserman Schultz	$27,831,559	Coastal Flooding
Florida	26	Rep. Diaz-Balart	$32,061,495	Riverine Flooding

Expected Annual Loss by Congressional District (118th Congress) (data source: FEMA, 2022)				
State	**District**	**Representative**	**Total Weather and Climate (Expected Annual Loss, $)***	**Largest Impact Event Type**
Florida	27	Rep. Salazar	$24,288,087	Riverine Flooding
Florida	28	Rep. Gimenez	$76,240,809	Riverine Flooding
Georgia	1	Rep. Carter	$51,125,852	Wildfire
Georgia	2	Rep. Bishop	$62,567,748	Hurricane
Georgia	3	Rep. Ferguson	$38,019,246	Tornado
Georgia	4	Rep. Johnson	$23,856,602	Tornado
Georgia	5	Rep. Williams	$22,873,626	Tornado
Georgia	6	Rep. McCormick	$31,577,131	Tornado
Georgia	7	Rep. McBath	$16,984,039	Tornado
Georgia	8	Rep. Scott	$41,218,075	Tornado
Georgia	9	Rep. Clyde	$39,017,125	Tornado
Georgia	10	Rep. Collins	$33,204,385	Tornado
Georgia	11	Rep. Loudermilk	$40,722,412	Tornado
Georgia	12	Rep. Allen	$54,961,863	Tornado
Georgia	13	Rep. Scott	$32,240,806	Tornado
Georgia	14	Rep. Greene	$63,404,218	Tornado
Hawaii**	1	Rep. Case	$4,440,629	Riverine Flooding
Hawaii**	2	Rep. Tokuda	$13,018,952	Riverine Flooding
Idaho	1	Rep. Fulcher	$28,807,145	Wildfire
Idaho	2	Rep. Simpson	$88,866,128	Drought
Illinois	1	Rep. Jackson	$25,298,710	Tornado
Illinois	2	Rep. Kelly	$35,580,607	Tornado
Illinois	3	Rep. Ramirez	$25,220,012	Tornado
Illinois	4	Rep. García	$23,495,994	Tornado
Illinois	5	Rep. Quigley	$23,362,655	Tornado
Illinois	6	Rep. Casten	$32,529,783	Tornado
Illinois	7	Rep. Davis	$22,763,840	Tornado
Illinois	8	Rep. Krishnamoorthi	$30,308,969	Tornado
Illinois	9	Rep. Schakowsky	$21,569,046	Tornado
Illinois	10	Rep. Schneider	$33,175,455	Tornado
Illinois	11	Rep. Foster	$33,280,637	Tornado
Illinois	12	Rep. Bost	$91,179,357	Tornado
Illinois	13	Rep. Budzinski	$65,014,932	Tornado
Illinois	14	Rep. Underwood	$36,443,138	Tornado
Illinois	15	Rep. Miller	$100,595,731	Tornado
Illinois	16	Rep. LaHood	$80,900,978	Tornado
Illinois	17	Rep. Sorensen	$67,884,386	Tornado
Indiana	1	Rep. Mrvan	$32,065,436	Tornado
Indiana	2	Rep. Yakym	$31,898,149	Drought
Indiana	3	Rep. Banks	$42,500,300	Tornado
Indiana	4	Rep. Baird	$44,486,492	Tornado
Indiana	5	Rep. Spartz	$37,192,615	Tornado
Indiana	6	Rep. Pence	$44,507,543	Tornado

State	District	Representative	Total Weather and Climate (Expected Annual Loss, $)*	Largest Impact Event Type
Expected Annual Loss by Congressional District (118th Congress) (data source: FEMA, 2022)				
Indiana	7	Rep. Carson	$15,892,624	Tornado
Indiana	8	Rep. Bucshon	$87,725,215	Tornado
Indiana	9	Rep. Houchin	$68,856,930	Tornado
Iowa	1	Rep. Miller-Meeks	$130,239,055	Tornado
Iowa	2	Rep. Hinson	$158,131,260	Riverine Flooding
Iowa	3	Rep. Nunn	$97,651,798	Tornado
Iowa	4	Rep. Feenstra	$230,240,028	Drought
Kansas	1	Rep. Mann	$298,770,919	Drought
Kansas	2	Rep. LaTurner	$97,388,383	Tornado
Kansas	3	Rep. Davids	$53,041,970	Tornado
Kansas	4	Rep. Estes	$112,402,093	Tornado
Kentucky	1	Rep. Comer	$99,619,649	Tornado
Kentucky	2	Rep. Guthrie	$63,511,814	Tornado
Kentucky	3	Rep. McGarvey	$61,871,624	Tornado
Kentucky	4	Rep. Massie	$57,881,421	Tornado
Kentucky	5	Rep. Rogers	$64,940,232	Riverine Flooding
Kentucky	6	Rep. Barr	$51,561,375	Tornado
Louisiana	1	Rep. Scalise	$236,129,991	Hurricane
Louisiana	2	Rep. Carter	$267,993,181	Hurricane
Louisiana	3	Rep. Higgins	$208,629,371	Riverine Flooding
Louisiana	4	Rep. Johnson	$90,124,092	Riverine Flooding
Louisiana	5	Rep. Letlow	$109,894,341	Riverine Flooding
Louisiana	6	Rep. Graves	$197,176,103	Riverine Flooding
Maine	1	Rep. Pingree	$15,972,741	Ice Storm
Maine	2	Rep. Golden	$28,161,766	Drought
Maryland	1	Rep. Harris	$90,359,454	Drought
Maryland	2	Rep. Ruppersberger	$11,997,367	Tornado
Maryland	3	Rep. Sarbanes	$20,265,721	Coastal Flooding
Maryland	4	Rep. Ivey	$11,104,704	Tornado
Maryland	5	Rep. Hoyer	$22,390,751	Coastal Flooding
Maryland	6	Rep. Trone	$23,010,713	Riverine Flooding
Maryland	7	Rep. Mfume	$19,163,033	Tornado
Maryland	8	Rep. Raskin	$9,263,284	Tornado
Massachusetts	1	Rep. Neal	$10,289,329	Riverine Flooding
Massachusetts	2	Rep. McGovern	$11,620,580	Riverine Flooding
Massachusetts	3	Rep. Trahan	$12,224,084	Riverine Flooding
Massachusetts	4	Rep. Auchincloss	$6,180,029	Riverine Flooding
Massachusetts	5	Rep. Clark	$8,604,468	Riverine Flooding
Massachusetts	6	Rep. Moulton	$10,738,173	Riverine Flooding
Massachusetts	7	Rep. Pressley	$6,553,473	Tornado
Massachusetts	8	Rep. Lynch	$13,104,186	Riverine Flooding
Massachusetts	9	Rep. Keating	$11,101,821	Riverine Flooding
Michigan	1	Rep. Bergman	$19,250,273	Cold Wave

Expected Annual Loss by Congressional District (118th Congress) (data source: FEMA, 2022)				
State	District	Representative	Total Weather and Climate (Expected Annual Loss, $)*	Largest Impact Event Type
Michigan	2	Rep. Moolenaar	$23,821,926	Strong Wind
Michigan	3	Rep. Scholten	$20,370,831	Strong Wind
Michigan	4	Rep. Huizenga	$18,973,695	Strong Wind
Michigan	5	Rep. Walberg	$28,483,276	Tornado
Michigan	6	Rep. Dingell	$36,244,373	Riverine Flooding
Michigan	7	Rep. Slotkin	$28,990,698	Strong Wind
Michigan	8	Rep. Kildee	$28,114,807	Strong Wind
Michigan	9	Rep. McClain	$29,217,963	Tornado
Michigan	10	Rep. James	$30,032,934	Riverine Flooding
Michigan	11	Rep. Stevens	$30,871,880	Tornado
Michigan	12	Rep. Tlaib	$21,545,781	Riverine Flooding
Michigan	13	Rep. Thanedar	$29,448,321	Riverine Flooding
Minnesota	1	Rep. Finstad	$119,814,340	Drought
Minnesota	2	Rep. Craig	$50,969,701	Strong Wind
Minnesota	3	Rep. Phillips	$35,004,472	Tornado
Minnesota	4	Rep. McCollum	$38,566,874	Tornado
Minnesota	5	Rep. Omar	$30,647,231	Tornado
Minnesota	6	Rep. Emmer	$55,079,464	Strong Wind
Minnesota	7	Rep. Fischbach	$134,774,390	Drought
Minnesota	8	Rep. Stauber	$31,746,492	Tornado
Mississippi	1	Rep. Kelly	$62,492,111	Tornado
Mississippi	2	Rep. Thompson	$122,722,596	Tornado
Mississippi	3	Rep. Guest	$133,253,973	Hurricane
Mississippi	4	Rep. Ezell	$234,345,464	Hurricane
Missouri	1	Rep. Bush	$126,447,468	Heat Wave
Missouri	2	Rep. Wagner	$90,657,433	Heat Wave
Missouri	3	Rep. Luetkemeyer	$75,008,176	Tornado
Missouri	4	Rep. Alford	$87,594,451	Tornado
Missouri	5	Rep. Cleaver	$56,914,439	Tornado
Missouri	6	Rep. Graves	$104,940,380	Tornado
Missouri	7	Rep. Burlison	$92,632,724	Tornado
Missouri	8	Rep. Smith	$114,866,507	Tornado
Montana	1	Rep. Zinke	$24,650,075	Wildfire
Montana	2	Rep. Rosendale	$35,917,554	Drought
Nebraska	1	Rep. Flood	$108,770,086	Tornado
Nebraska	2	Rep. Bacon	$73,891,396	Tornado
Nebraska	3	Rep. Smith	$255,129,248	Hail
Nevada	1	Rep. Titus	$9,927,157	Heat Wave
Nevada	2	Rep. Amodei	$181,087,139	Drought
Nevada	3	Rep. Lee	$7,702,261	Heat Wave
Nevada	4	Rep. Horsford	$19,571,701	Drought
New Hampshire	1	Rep. Pappas	$12,006,516	Riverine Flooding
New Hampshire	2	Rep. Kuster	$17,810,514	Riverine Flooding

Expected Annual Loss by Congressional District (118th Congress) (data source: FEMA, 2022)				
State	**District**	**Representative**	**Total Weather and Climate (Expected Annual Loss, $)***	**Largest Impact Event Type**
New Jersey	1	Rep. Norcross	$19,440,285	Riverine Flooding
New Jersey	2	Rep. Van Drew	$215,959,605	Coastal Flooding
New Jersey	3	Rep. Kim	$36,934,987	Riverine Flooding
New Jersey	4	Rep. Smith	$186,646,803	Coastal Flooding
New Jersey	5	Rep. Gottheimer	$26,479,357	Coastal Flooding
New Jersey	6	Rep. Pallone	$58,890,900	Coastal Flooding
New Jersey	7	Rep. Kean	$52,290,334	Riverine Flooding
New Jersey	8	Rep. Menendez	$40,820,139	Coastal Flooding
New Jersey	9	Rep. Pascrell	$82,033,393	Coastal Flooding
New Jersey	10	Rep. Payne	$13,029,961	Strong Wind
New Jersey	11	Rep. Sherrill	$28,368,470	Riverine Flooding
New Jersey	12	Rep. Watson Coleman	$50,554,077	Riverine Flooding
New Mexico	1	Rep. Stansbury	$21,819,371	Riverine Flooding
New Mexico	2	Rep. Vasquez	$60,805,230	Drought
New Mexico	3	Rep. Leger Fernandez	$57,104,940	Drought
New York	1	Rep. LaLota	$8,089,360	Riverine Flooding
New York	2	Rep. Garbarino	$15,731,968	Riverine Flooding
New York	3	Rep. Santos	$7,434,156	Ice Storm
New York	4	Rep. D'Esposito	$19,049,090	Riverine Flooding
New York	5	Rep. Meeks	$8,097,025	Strong Wind
New York	6	Rep. Meng	$5,409,754	Strong Wind
New York	7	Rep. Velázquez	$9,327,956	Coastal Flooding
New York	8	Rep. Jeffries	$20,751,696	Coastal Flooding
New York	9	Rep. Clarke	$6,340,084	Strong Wind
New York	10	Rep. Goldman	$13,292,146	Riverine Flooding
New York	11	Rep. Malliotakis	$20,430,087	Riverine Flooding
New York	12	Rep. Nadler	$9,824,904	Strong Wind
New York	13	Rep. Espaillat	$9,588,465	Strong Wind
New York	14	Rep. Ocasio-Cortez	$13,857,589	Riverine Flooding
New York	15	Rep. Torres	$8,712,206	Strong Wind
New York	16	Rep. Bowman	$6,037,159	Strong Wind
New York	17	Rep. Lawler	$11,577,779	Strong Wind
New York	18	Rep. Ryan	$17,589,367	Tornado
New York	19	Rep. Molinaro	$63,837,571	Riverine Flooding
New York	20	Rep. Tonko	$17,001,851	Tornado
New York	21	Rep. Stefanik	$24,016,281	Riverine Flooding
New York	22	Rep. Williams	$21,107,946	Riverine Flooding
New York	23	Rep. Langworthy	$23,875,441	Riverine Flooding
New York	24	Rep. Tenney	$27,179,829	Drought
New York	25	Rep. Morelle	$8,848,660	Tornado
New York	26	Rep. Higgins	$9,012,967	Tornado
North Carolina	1	Rep. Davis	$135,300,965	Hurricane
North Carolina	2	Rep. Ross	$20,596,788	Riverine Flooding

Expected Annual Loss by Congressional District (118th Congress) (data source: FEMA, 2022)				
State	**District**	**Representative**	**Total Weather and Climate (Expected Annual Loss, $)***	**Largest Impact Event Type**
North Carolina	3	Rep. Murphy	$215,288,645	Hurricane
North Carolina	4	Rep. Foushee	$55,864,346	Hurricane
North Carolina	5	Rep. Foxx	$38,074,885	Tornado
North Carolina	6	Rep. Manning	$22,420,055	Tornado
North Carolina	7	Rep. Rouzer	$147,999,264	Hurricane
North Carolina	8	Rep. Bishop	$62,521,747	Tornado
North Carolina	9	Rep. Hudson	$86,527,960	Hurricane
North Carolina	10	Rep. McHenry	$52,338,385	Tornado
North Carolina	11	Rep. Edwards	$39,394,895	Tornado
North Carolina	12	Rep. Adams	$18,223,585	Tornado
North Carolina	13	Rep. Nickel	$62,104,364	Hurricane
North Carolina	14	Rep. Jackson	$21,315,005	Tornado
North Dakota	At-Large	Rep. Armstrong	$138,912,150	Cold Wave
Ohio	1	Rep. Landsman	$31,509,522	Tornado
Ohio	2	Rep. Wenstrup	$34,890,205	Riverine Flooding
Ohio	3	Rep. Beatty	$23,745,871	Tornado
Ohio	4	Rep. Jordan	$30,000,832	Tornado
Ohio	5	Rep. Latta	$38,699,661	Tornado
Ohio	6	Rep. Johnson	$24,040,379	Riverine Flooding
Ohio	7	Rep. Miller	$22,584,219	Tornado
Ohio	8	Rep. Davidson	$38,017,478	Tornado
Ohio	9	Rep. Kaptur	$32,616,853	Tornado
Ohio	10	Rep. Turner	$22,695,704	Tornado
Ohio	11	Rep. Brown	$16,275,390	Tornado
Ohio	12	Rep. Balderson	$25,371,226	Riverine Flooding
Ohio	13	Rep. Sykes	$24,430,139	Riverine Flooding
Ohio	14	Rep. Joyce	$17,702,812	Riverine Flooding
Ohio	15	Rep. Carey	$26,449,785	Tornado
Oklahoma	1	Rep. Hern	$91,800,155	Heat Wave
Oklahoma	2	Rep. Brecheen	$164,042,307	Tornado
Oklahoma	3	Rep. Lucas	$157,354,945	Tornado
Oklahoma	4	Rep. Cole	$93,243,596	Tornado
Oklahoma	5	Rep. Bice	$103,925,786	Tornado
Oregon	1	Rep. Bonamici	$71,497,610	Coastal Flooding
Oregon	2	Rep. Bentz	$31,240,283	Wildfire
Oregon	3	Rep. Blumenauer	$4,510,489	Riverine Flooding
Oregon	4	Rep. Hoyle	$18,092,455	Riverine Flooding
Oregon	5	Rep. Chavez-DeRemer	$8,906,052	Riverine Flooding
Oregon	6	Rep. Salinas	$5,099,805	Riverine Flooding
Pennsylvania	1	Rep. Fitzpatrick	$26,095,708	Riverine Flooding
Pennsylvania	2	Rep. Boyle	$20,793,756	Heat Wave
Pennsylvania	3	Rep. Evans	$18,887,519	Heat Wave
Pennsylvania	4	Rep. Dean	$29,580,330	Riverine Flooding

Expected Annual Loss by Congressional District (118th Congress) (data source: FEMA, 2022)				
State	**District**	**Representative**	**Total Weather and Climate (Expected Annual Loss, $)***	**Largest Impact Event Type**
Pennsylvania	5	Rep. Scanlon	$32,935,112	Coastal Flooding
Pennsylvania	6	Rep. Houlahan	$41,677,729	Drought
Pennsylvania	7	Rep. Wild	$18,825,604	Riverine Flooding
Pennsylvania	8	Rep. Cartwright	$32,566,126	Riverine Flooding
Pennsylvania	9	Rep. Meuser	$29,688,076	Riverine Flooding
Pennsylvania	10	Rep. Perry	$19,504,093	Riverine Flooding
Pennsylvania	11	Rep. Smucker	$10,191,586	Riverine Flooding
Pennsylvania	12	Rep. Lee	$9,031,559	Riverine Flooding
Pennsylvania	13	Rep. Joyce	$17,326,883	Riverine Flooding
Pennsylvania	14	Rep. Reschenthaler	$13,741,067	Riverine Flooding
Pennsylvania	15	Rep. Thompson	$20,433,399	Riverine Flooding
Pennsylvania	16	Rep. Kelly	$15,552,046	Riverine Flooding
Pennsylvania	17	Rep. Deluzio	$14,649,627	Riverine Flooding
Rhode Island	1	Rep. Cicilline	$4,893,011	Riverine Flooding
Rhode Island	2	Rep. Magaziner	$7,447,519	Riverine Flooding
South Carolina	1	Rep. Mace	$33,954,720	Wildfire
South Carolina	2	Rep. Wilson	$44,471,065	Tornado
South Carolina	3	Rep. Duncan	$34,090,143	Tornado
South Carolina	4	Rep. Timmons	$19,959,716	Tornado
South Carolina	5	Rep. Norman	$52,901,809	Tornado
South Carolina	6	Rep. Clyburn	$45,265,533	Hurricane
South Carolina	7	Rep. Fry	$65,412,465	Hurricane
South Dakota	At-Large	Rep. Johnson	$215,311,899	Tornado
Tennessee	1	Rep. Harshbarger	$23,252,242	Tornado
Tennessee	2	Rep. Burchett	$27,878,508	Tornado
Tennessee	3	Rep. Fleischmann	$52,291,713	Tornado
Tennessee	4	Rep. DesJarlais	$57,668,400	Tornado
Tennessee	5	Rep. Ogles	$57,737,677	Riverine Flooding
Tennessee	6	Rep. Rose	$64,684,473	Tornado
Tennessee	7	Rep. Green	$57,693,937	Tornado
Tennessee	8	Rep. Kustoff	$118,786,802	Tornado
Tennessee	9	Rep. Cohen	$127,653,656	Riverine Flooding
Texas	1	Rep. Moran	$70,810,069	Tornado
Texas	2	Rep. Crenshaw	$193,167,897	Hurricane
Texas	3	Rep. Self	$129,178,505	Tornado
Texas	4	Rep. Fallon	$105,988,515	Tornado
Texas	5	Rep. Gooden	$38,788,395	Tornado
Texas	6	Rep. Ellzey	$48,615,365	Tornado
Texas	7	Rep. Fletcher	$252,599,180	Hurricane
Texas	8	Rep. Luttrell	$153,322,396	Hurricane
Texas	9	Rep. Green	$256,906,476	Hurricane
Texas	10	Rep. McCaul	$71,998,294	Tornado
Texas	11	Rep. Pfluger	$73,564,386	Wildfire

Expected Annual Loss by Congressional District (118th Congress) (data source: FEMA, 2022)				
State	**District**	**Representative**	**Total Weather and Climate (Expected Annual Loss, $)***	**Largest Impact Event Type**
Texas	12	Rep. Granger	$48,043,687	Tornado
Texas	13	Rep. Jackson	$235,119,886	Drought
Texas	14	Rep. Weber	$557,044,837	Hurricane
Texas	15	Rep. De La Cruz	$48,227,369	Riverine Flooding
Texas	16	Rep. Escobar	$17,054,796	Riverine Flooding
Texas	17	Rep. Sessions	$54,890,714	Tornado
Texas	18	Rep. Jackson Lee	$190,284,289	Hurricane
Texas	19	Rep. Arrington	$201,941,404	Drought
Texas	20	Rep. Castro	$36,021,444	Riverine Flooding
Texas	21	Rep. Roy	$90,925,131	Riverine Flooding
Texas	22	Rep. Nehls	$264,821,156	Hurricane
Texas	23	Rep. Gonzales	$68,274,951	Riverine Flooding
Texas	24	Rep. Van Duyne	$56,258,747	Hail
Texas	25	Rep. Williams	$64,035,726	Tornado
Texas	26	Rep. Burgess	$89,653,409	Tornado
Texas	27	Rep. Cloud	$166,350,470	Hurricane
Texas	28	Rep. Cuellar	$44,124,376	Riverine Flooding
Texas	29	Rep. Garcia	$165,324,205	Hurricane
Texas	30	Rep. Crockett	$40,134,894	Hail
Texas	31	Rep. Carter	$44,268,713	Tornado
Texas	32	Rep. Allred	$57,990,094	Tornado
Texas	33	Rep. Veasey	$38,965,842	Tornado
Texas	34	Rep. Gonzalez	$63,293,256	Hurricane
Texas	35	Rep. Casar	$59,648,455	Riverine Flooding
Texas	36	Rep. Babin	$251,513,994	Hurricane
Texas	37	Rep. Doggett	$48,084,818	Tornado
Texas	38	Rep. Hunt	$163,655,811	Hurricane
Utah	1	Rep. Moore	$15,754,239	Wildfire
Utah	2	Rep. Stewart	$65,403,575	Riverine Flooding
Utah	3	Rep. Curtis	$11,052,134	Wildfire
Utah	4	Rep. Owens	$17,132,561	Wildfire
Vermont	At-Large	Rep. Balint	$19,411,530	Riverine Flooding
Virginia	1	Rep. Wittman	$41,923,051	Coastal Flooding
Virginia	2	Rep. Kiggans	$41,920,670	Coastal Flooding
Virginia	3	Rep. Scott	$31,330,635	Riverine Flooding
Virginia	4	Rep. McClellan	$22,047,300	Tornado
Virginia	5	Rep. Good	$33,517,846	Drought
Virginia	6	Rep. Cline	$31,139,607	Riverine Flooding
Virginia	7	Rep. Spanberger	$18,897,914	Tornado
Virginia	8	Rep. Beyer	$10,679,042	Tornado
Virginia	9	Rep. Griffith	$28,802,807	Riverine Flooding
Virginia	10	Rep. Wexton	$17,710,257	Tornado
Virginia	11	Rep. Connolly	$7,066,042	Strong Wind

Expected Annual Loss by Congressional District (118th Congress) (data source: FEMA, 2022)				
State	**District**	**Representative**	**Total Weather and Climate (Expected Annual Loss, $)***	**Largest Impact Event Type**
Washington	1	Rep. DelBene	$7,660,789	Coastal Flooding
Washington	2	Rep. Larsen	$57,135,167	Coastal Flooding
Washington	3	Rep. Perez	$37,602,537	Coastal Flooding
Washington	4	Rep. Newhouse	$23,959,201	Cold Wave
Washington	5	Rep. Rodgers	$11,646,157	Cold Wave
Washington	6	Rep. Kilmer	$95,012,954	Coastal Flooding
Washington	7	Rep. Jayapal	$78,537,556	Coastal Flooding
Washington	8	Rep. Schrier	$11,055,517	Wildfire
Washington	9	Rep. Smith	$11,964,533	Coastal Flooding
Washington	10	Rep. Strickland	$2,989,031	Coastal Flooding
West Virginia	1	Rep. Miller	$49,576,211	Riverine Flooding
West Virginia	2	Rep. Mooney	$31,121,262	Riverine Flooding
Wisconsin	1	Rep. Steil	$23,896,494	Tornado
Wisconsin	2	Rep. Pocan	$34,223,218	Tornado
Wisconsin	3	Rep. Van Orden	$50,940,923	Riverine Flooding
Wisconsin	4	Rep. Moore	$19,180,273	Tornado
Wisconsin	5	Rep. Fitzgerald	$30,521,977	Tornado
Wisconsin	6	Rep. Grothman	$40,160,122	Tornado
Wisconsin	7	Rep. Tiffany	$33,958,238	Strong Wind
Wisconsin	8	Rep. Gallagher	$21,514,954	Tornado
Wyoming	At-Large	Rep. Hageman	$42,070,099	Wildfire