Congressional Budget Office
*Nonpartisan Analysis for the U.S. Congress*

# Climate Change, Disaster Risk, and Homeowner's Insurance

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Presentation at the

American Academy of Actuaries Annual Meeting

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For more information about the meeting, see www.actuary.org/annualmeeting24.

# Key Questions Addressed in the Report

How is climate change affecting the risk of natural disasters?

How are homeowners responding to the risk of natural disasters?

How do insurers cover the risk of natural disasters and price that risk?

How could different types of insurance policies make insurance more affordable for low- and moderate-income households?

What policy approaches could expand the supply of disaster insurance?

# Background

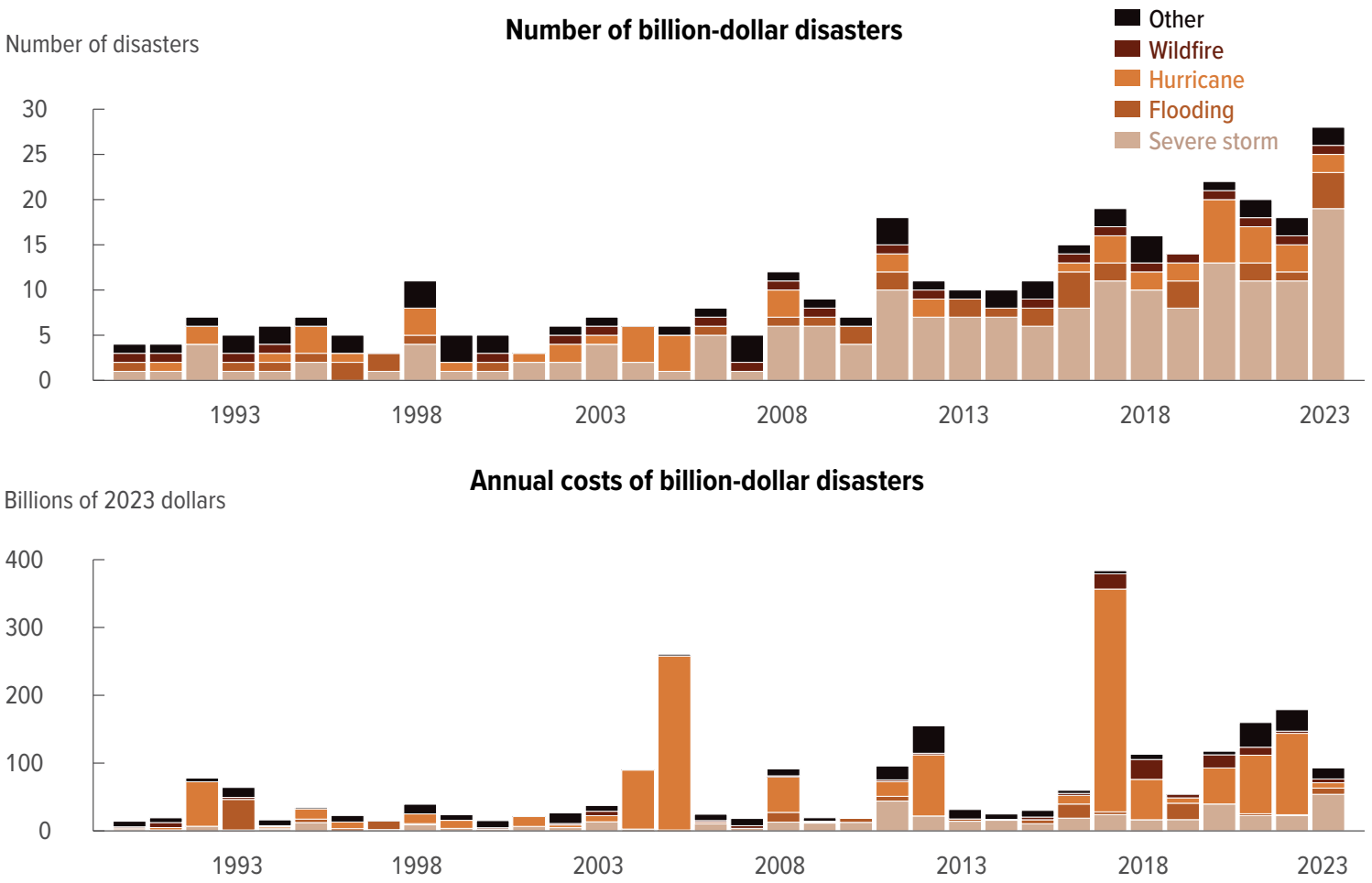
Climate change is increasing the severity of natural disasters, including hurricanes, floods, and wildfires. Losses are likely to continue to rise.

Climate change is also increasing the uncertainty about projected losses from natural disasters.

That uncertainty is one factor causing private insurers to reduce the availability and affordability of insurance.

# Climate Change and Natural Disasters

# Billion-Dollar Natural Disasters

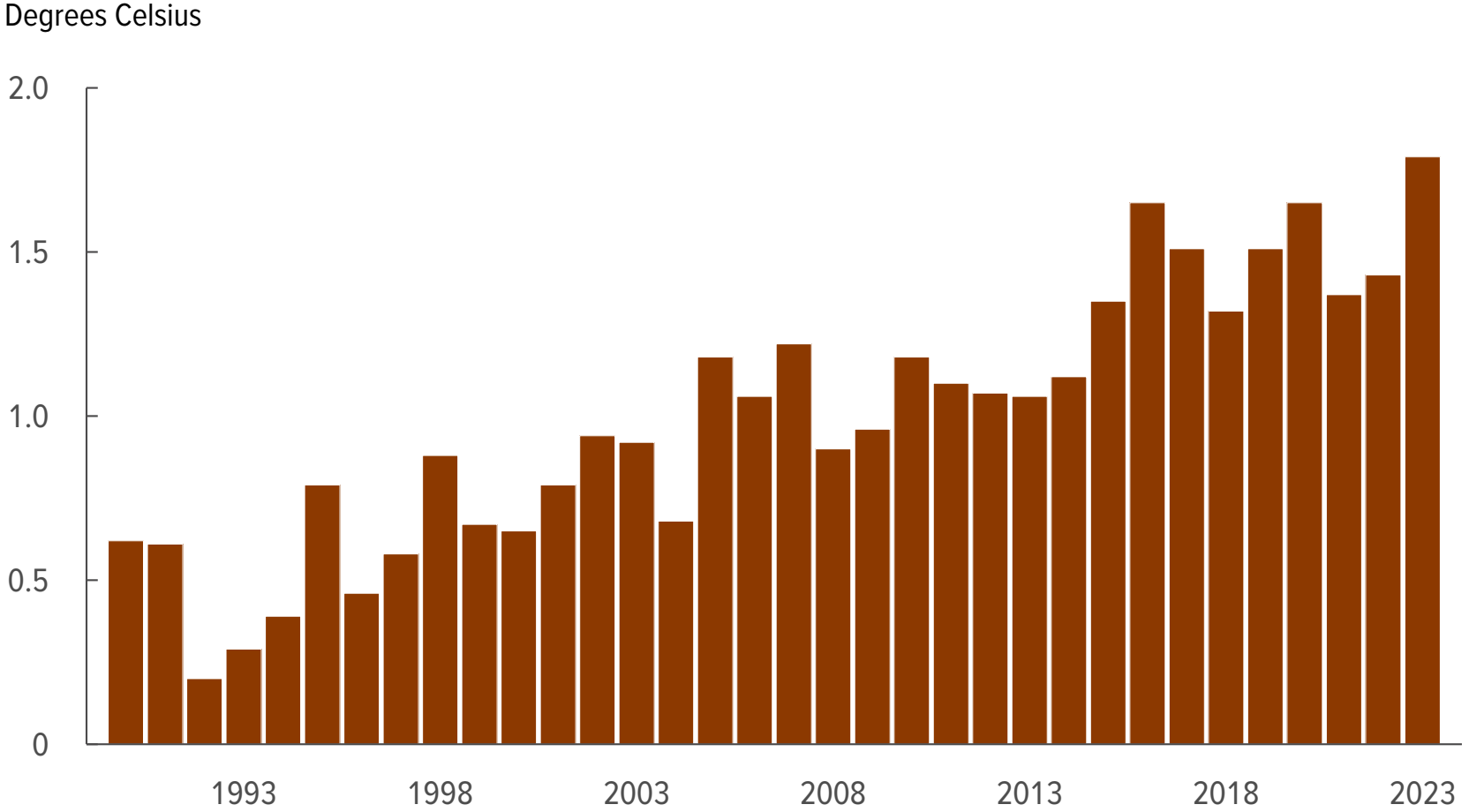



The number of natural disasters that have caused at least $1 billion in damages has increased significantly since the early 1990s. In most years, hurricanes are the costliest type of billion-dollar disaster, even if they account for relatively few of the year's billion-dollar disasters. By contrast, billion-dollar severe storms occur most frequently but cause less annual damage than other types of natural disaster.

Data source: Congressional Budget Office, using data from the National Oceanic and Atmospheric Administration, National Centers for Environmental Information. See www.cbo.gov/publication/59918#data.

Other consists of droughts, freezes, and winter storms. Severe storms are hailstorms, derechos, high winds, and tornadoes.

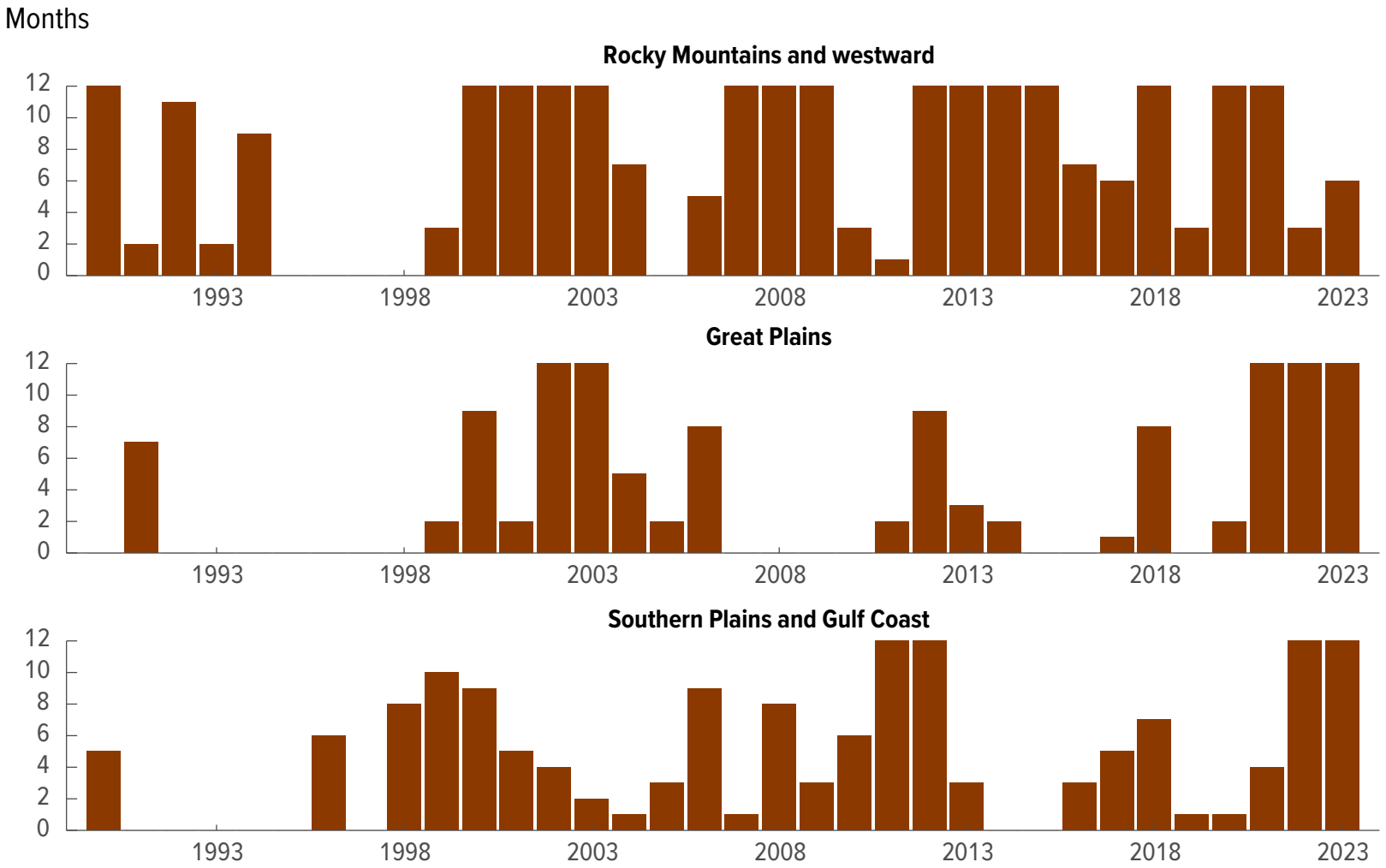
# Amount by Which the Average Global Land Temperature Exceeded the 20th-Century Average




Hotter temperatures can leave vegetation and plant debris drier and more susceptible to fire. In every year since 2010, global average annual land temperatures have exceeded the average over the 1901–2000 period by more than 1 degree Celsius (or about 1.8 degrees Fahrenheit).

Data source: Congressional Budget Office, using data from the National Oceanic and Atmospheric Administration, National Centers for Environmental Information. See www.cbo.gov/publication/59918#data.

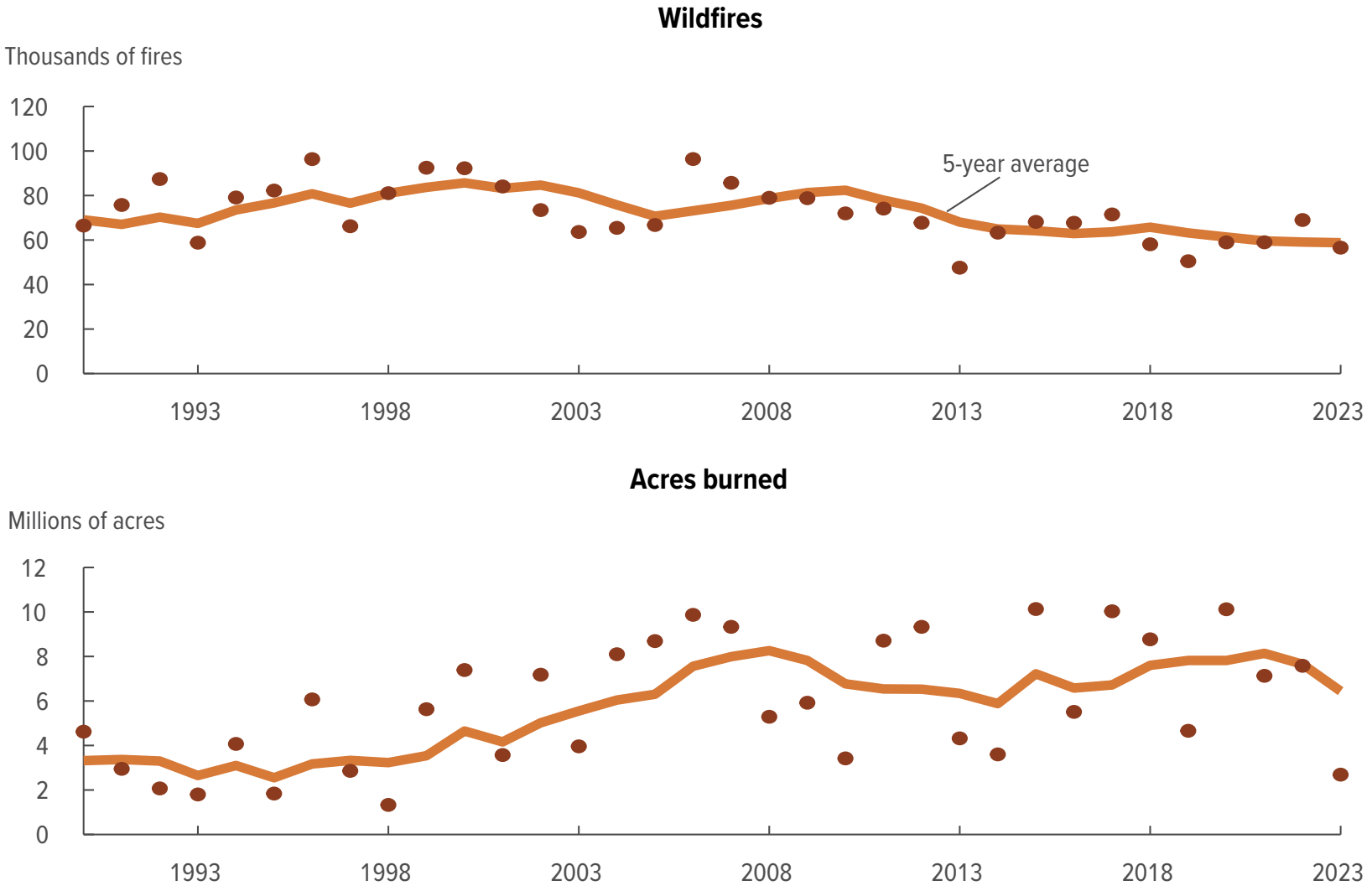
# Drought Months, by Region




Drought and abnormally dry weather leave vegetation and plant debris drier and easier to ignite. In the Rocky Mountains and westward, drought conditions have persisted through much or all of the year for most years since 2000. Other regions have also experienced many months of drought conditions.

Data source: Congressional Budget Office, using data from the National Oceanic and Atmospheric Administration, National Centers for Environmental Information. See www.cbo.gov/publication/59918#data.

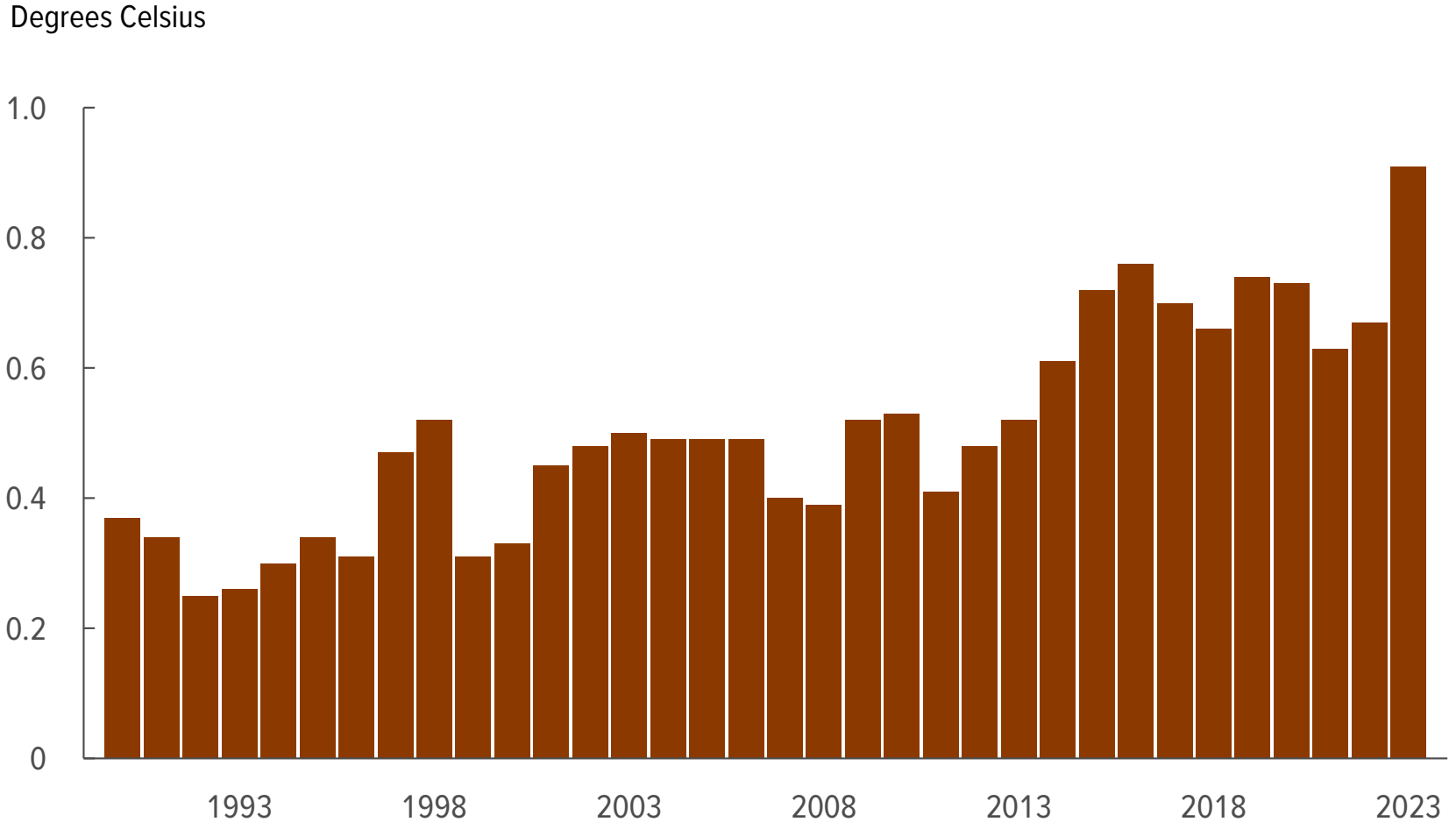
# Wildfires




The number of wildfires that occur each year in the United States fluctuates. Although the five-year moving average of the number of wildfires has decreased over the past three decades, the area affected by wildfires has not seen the same decrease because the average wildfire has grown larger over time. In 2023, the five-year moving average of the number of acres burned was about double what it had been in the early 1990s.

Data source: Congressional Budget Office, using data from the National Interagency Fire Center. See www.cbo.gov/publication/59918#data.

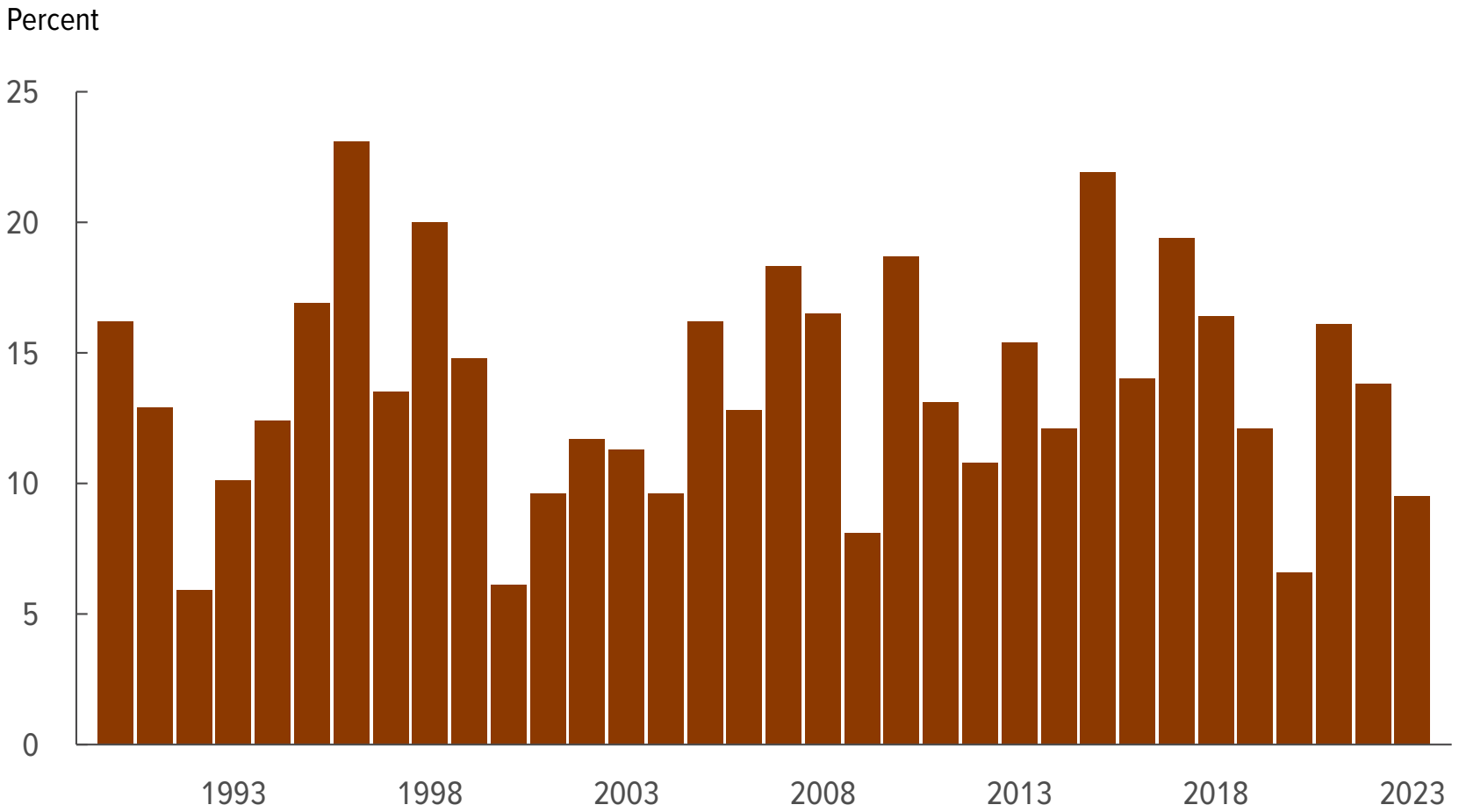
# Amount by Which the Average Global Ocean Temperature Exceeded the 20th-Century Average




Warmer ocean temperatures contribute to higher sea levels and increase the amount of moisture a storm can hold. In 2023, ocean temperatures were nearly 1 degree Celsius (or 1.6 degrees Fahrenheit) above the 20th-century average.

Data source: Congressional Budget Office, using data from the National Oceanic and Atmospheric Administration, National Centers for Environmental Information. See www.cbo.gov/publication/59918#data.

# Land Area of the United States That Received a Much Greater Than Normal Share of Precipitation in One-Day Precipitation Events




When large amounts of precipitation fall in a short period of time, the ground may not be able to absorb it all, which leads to flooding. In 8 of the past 10 years, more than 10 percent of the land area in the United States has received a much greater than normal share of precipitation from one-day precipitation events.

Data source: Congressional Budget Office, using data from the National Oceanic and Atmospheric Administration. See www.cbo.gov/publication/59918#data.

# Relative Sea Level Change Along U.S. Coasts, 1960 to 2021

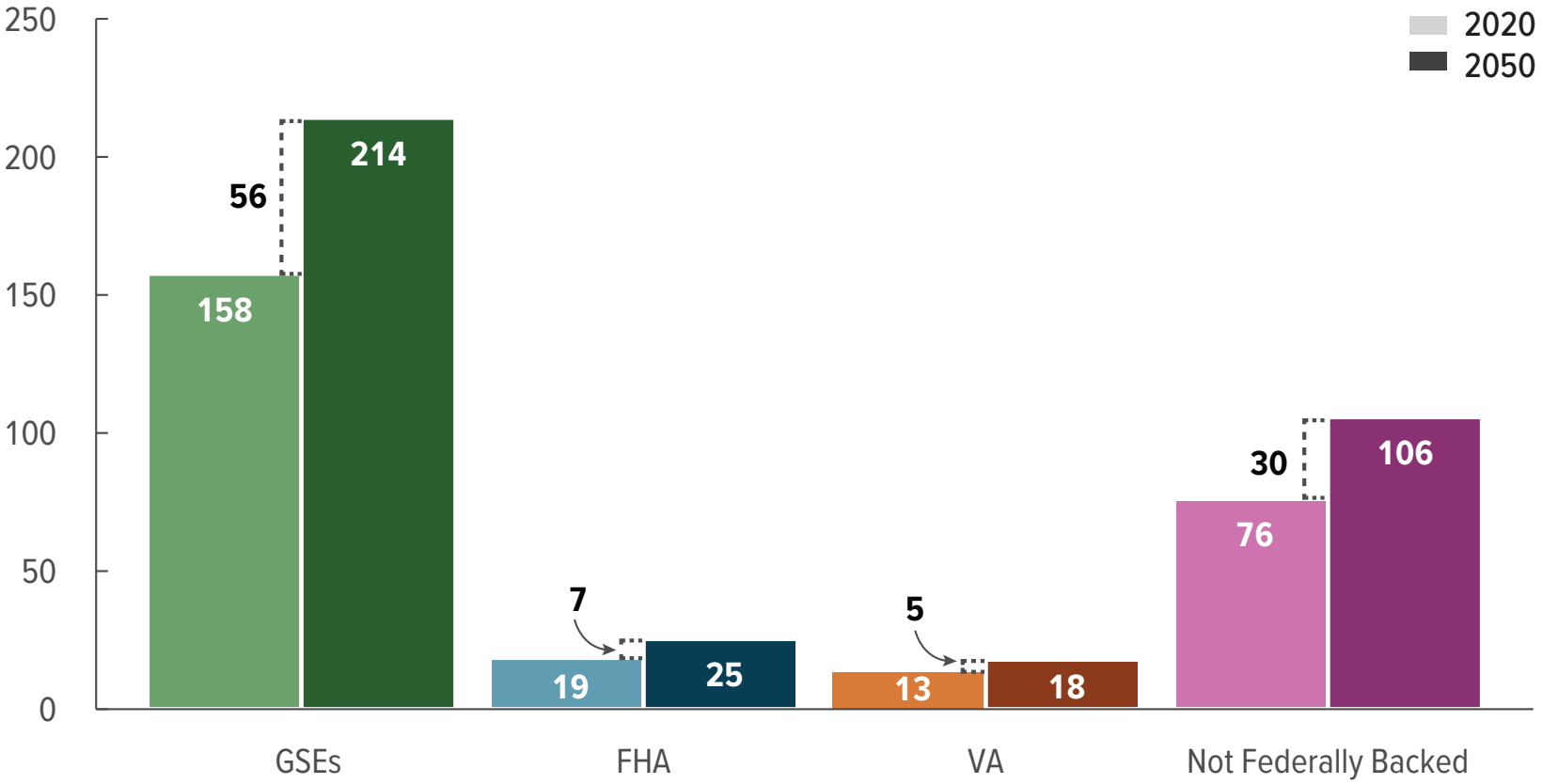

Since 1960, relative sea levels have risen by more than 8 inches in many locations along the Gulf and East Coasts. Those increases are caused by rising global sea levels and local land subsidence patterns (that is, how much the land is sinking). Groundwater extraction, oil and gas extraction, and tectonic changes can contribute to land subsidence. By contrast, relative sea levels have fallen in many locations along Alaska's coastline. Research suggests that land is rising as the glaciers above it shrink.

Data source: Congressional Budget Office, using data from the National Oceanic and Atmospheric Administration. See www.cbo.gov/publication/59918#data.

Relative sea level refers to the height of the ocean relative to land at a particular location.

# Natural Disaster Risk and Federal Programs

# Present Value of Expected Flood Damage to Homes With Mortgages




The present value of 30 years of expected flood damage for homes with mortgages backed by the GSEs, FHA, or VA totals $190 billion in the 2020 period. That value increases by 36 percent, to $258 billion, in the 2050 period.

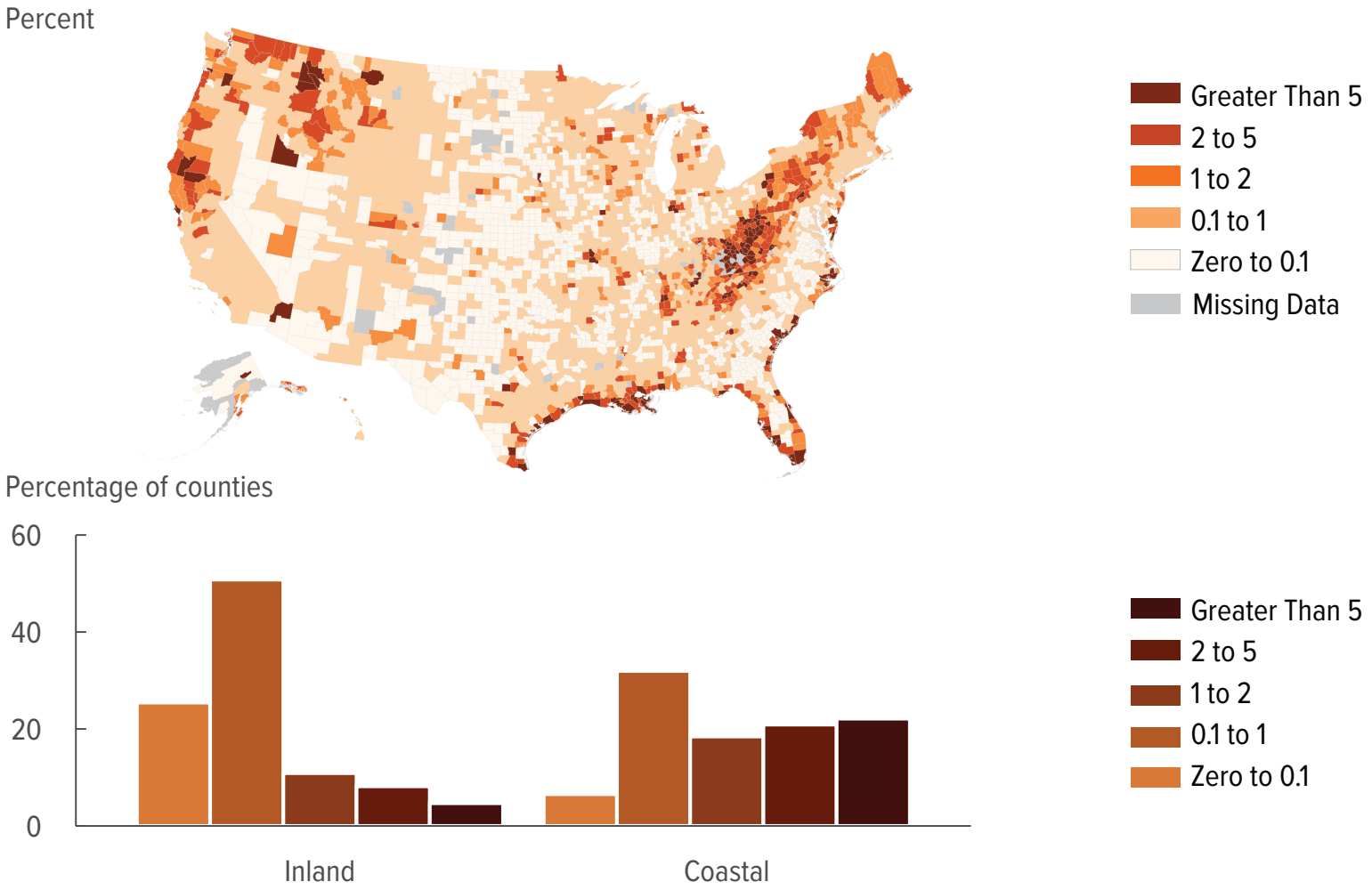
Most of the present value of expected damage in both periods is attributable to homes with mortgages backed by the GSEs.

Congressional Budget Office, *Flood Damage and Federally Backed Mortgages in a Changing Climate* (November 2023), p. 7, www.cbo.gov/publication/59379.

A present value is a single number that expresses a flow of current and future income or payments in terms of an equivalent lump sum received or paid at a specific time.

FHA = Federal Housing Administration; GSE = government-sponsored enterprise; VA = Department of Veterans Affairs.

# Present Value of Flood Damage to Homes With Federally Backed Mortgages as a Percentage of Total Property Value in the 2020 Period



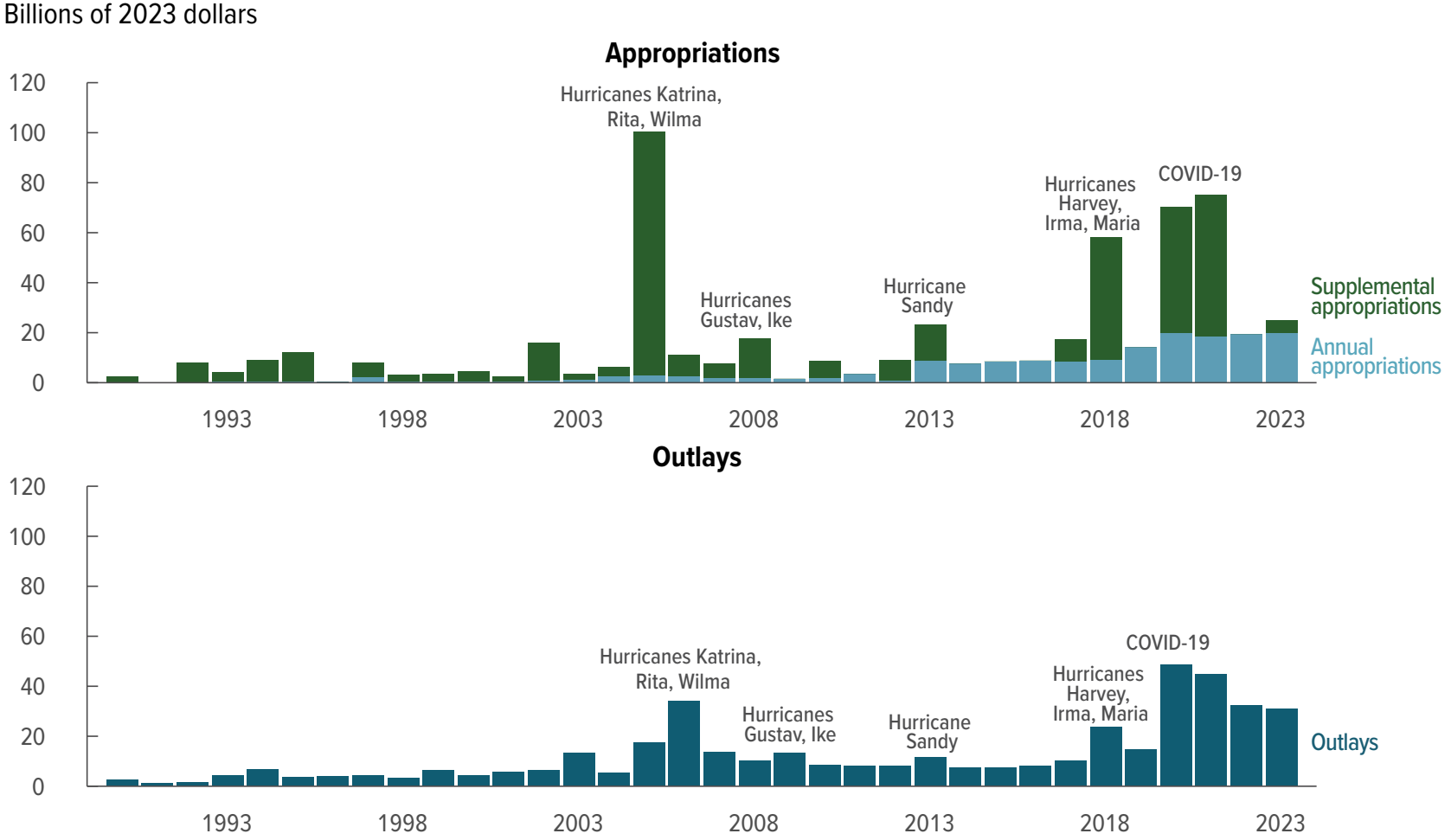

The present value of flood damage as a percentage of total property value among homes with federally backed mortgages is highest in some coastal counties and in inland counties in Idaho and the Appalachian region.

Over 20 percent of coastal counties face a present value of flood damage to property with a federally backed mortgage that is greater than 5 percent of the total value of that property.

Congressional Budget Office, *Flood Damage and Federally Backed Mortgages in a Changing Climate* (November 2023), p. 12, www.cbo.gov/publication/59379.

A present value is a single number that expresses a flow of current and future income or payments in terms of an equivalent lump sum received or paid at a specific time.

# FEMA's Supplemental Appropriations for Disasters, 1990 to 2023




Supplemental appropriations for a handful of disasters have been the main driver of the increased amounts of funding for the Disaster Relief Fund over the past 30 years. That funding is spent over multiple years, leading to increased outlays from the fund for several years after a disaster.

Data source: Congressional Budget Office. See www.cbo.gov/publication/59918#data.

FEMA = Federal Emergency Management Agency.

# Homeowner’s Insurance: Affordability, Protection Gaps, and Approaches to Expanding Supply

# Affordability, Availability, and the Financial Soundness of Homeowner's Insurance

Some state regulators have held premiums down to increase affordability and required insurers to continue to renew certain policies for a specified period.

That has prompted insurers to reduce availability of insurance over time in areas with the most natural disaster risk.

States have established residual markets (often called FAIR plans) to ensure availability, but those plans are not financially sound.

FAIR = Fair Access to Insurance Requirements.

# Approaches to Improving Affordability of Natural Disaster Insurance to Homeowners

- Means-tested (that is, income-based) subsidies could target low- and moderate-income households but at a cost to taxpayers.

- Other approaches could lower the costs to policyholders but are designed to work with traditional insurance policies rather than replace them:
  - **Parametric insurance**, in which predetermined payouts are triggered by meeting an objective parameter, such as wind speed.
  - **Community-based insurance**, in which a local government or community group works with insurers to provide some coverage to multiple properties in a community.

- Governments and communities could work to reduce risk and future losses through adaptation efforts. Those efforts could decrease premiums.

# The Insurance Protection Gap

If natural disasters stemming from climate change increase the volatility and uncertainty of losses beyond modeling capabilities, private markets might not close the protection gap.

- The protection gap is the difference between total economic losses and insured losses.
- In 2023, insurance covered about 70 percent of the more than $100 billion of losses in the United States from natural disasters.
- Lack of insurance coverage weakens recovery from disasters, imposes losses on federally backed mortgages, and increases demand for federal assistance.

# Approaches to Increasing the Availability of Natural Disaster Insurance for Homeowners

Two general approaches could increase the availability of disaster insurance:

- A public-private risk-sharing program, modeled along the lines of the terrorism risk insurance program, that would reinsure private insurers.

- A program with little or no risk sharing that would resemble the National Flood Insurance Program.

# Approaches to Expanding the Supply of Disaster Insurance

**Public-private insurance program with risk sharing**


**Federal insurance program with little or no risk sharing**


Under a risk-sharing approach, the federal government acts as a reinsurer, or insurer for insurers. Property and casualty insurers assume losses up to a certain threshold; after that, the government bears losses.

Under an approach with no risk sharing, the property and casualty insurers bear no risk: They collect the premiums and pass them through, retaining a portion to cover their administrative and operating costs. The insurers are responsible for claims payments but are reimbursed by the federal program.

Data source: Congressional Budget Office.

# Alternative Policy Approaches to Providing Disaster Insurance

| | Current policy | Public-private insurance program with risk sharing | Federal insurance program with little or no risk sharing |
|---|---|---|---|
| Availability | Limited availability in some high-risk areas | Greater availability | Greatest availability |
| Risk to the federal government | Limited explicit risk but highest implicit risk | Higher explicit risk but lower implicit risk | Highest explicit risk but limited implicit risk |
| Potential budgetary costs | Net cost of the NFIP as well as the cost of federal assistance after a disaster | Higher costs in most cases, depending on how premiums were set | Highest costs, depending on how premiums were set |
| Incentives to take preventive measures to reduce losses | Strong incentives | Weaker incentives | Weakest incentives |
| Demand for federal assistance after a disaster | High demand | Lower demand | Lowest demand |
| Economic effects | Coverage gaps lessen resiliency | Greater resiliency | Greatest resiliency |

Data source: Congressional Budget Office.

NFIP = National Flood Insurance Program.

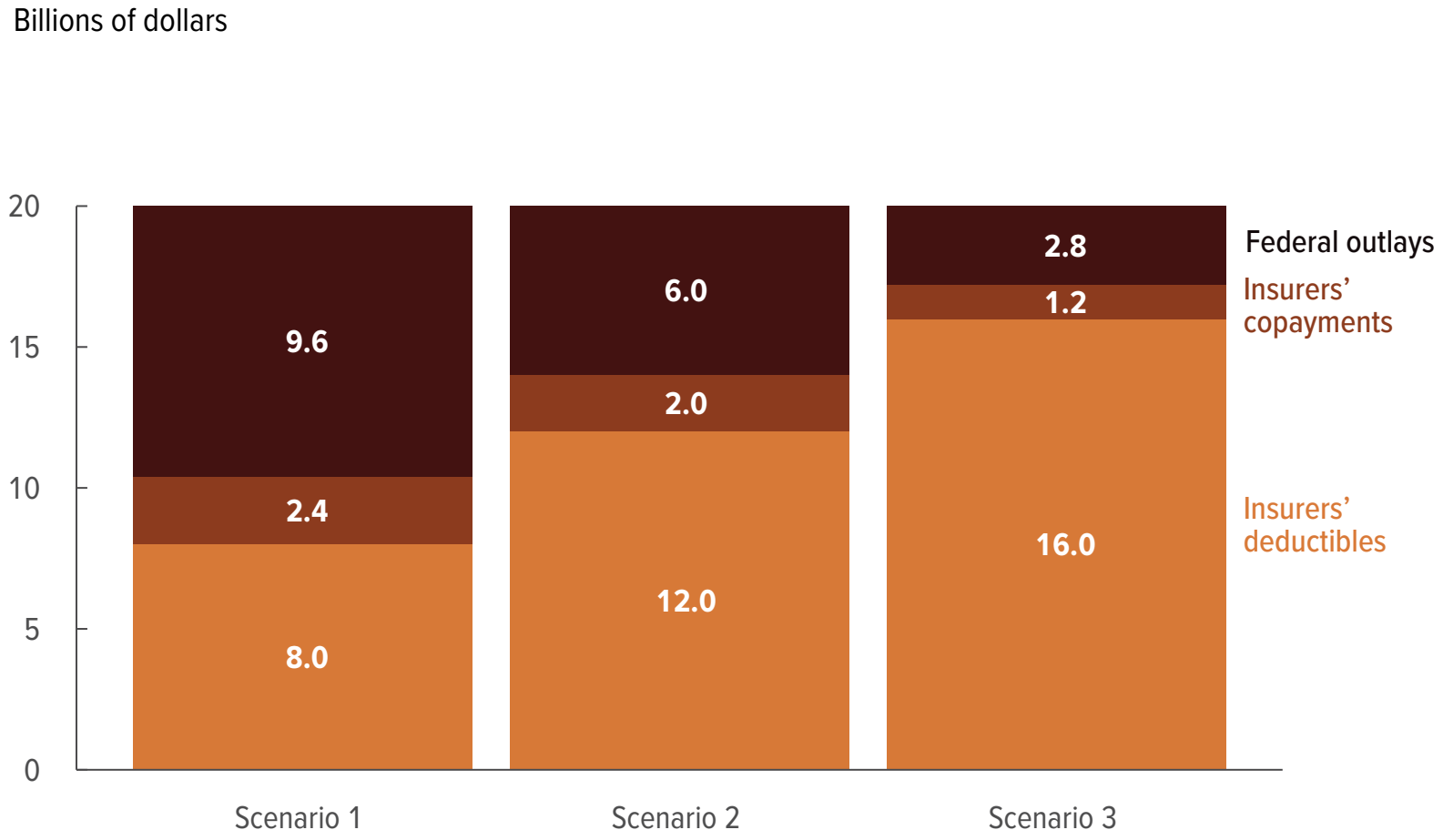
# Key Takeaways

- Both approaches (public-private insurance program with risk sharing and federal insurance program with little or no risk sharing) would probably have budget costs; how closely premiums matched risks would affect the size of the costs.

- Both approaches would allow faster recovery, reduce demands for supplemental federal disaster assistance, and decrease losses on federally backed mortgages.

- If premiums understated risks, either approach would subsidize development in risky areas and reduce incentives for property owners to take cost-effective preventive measures to reduce risk, which would increase overall losses.

# Allocation of Potential Insured Losses of $20 Billion for Wildfire Risk Insurance: Three Scenarios

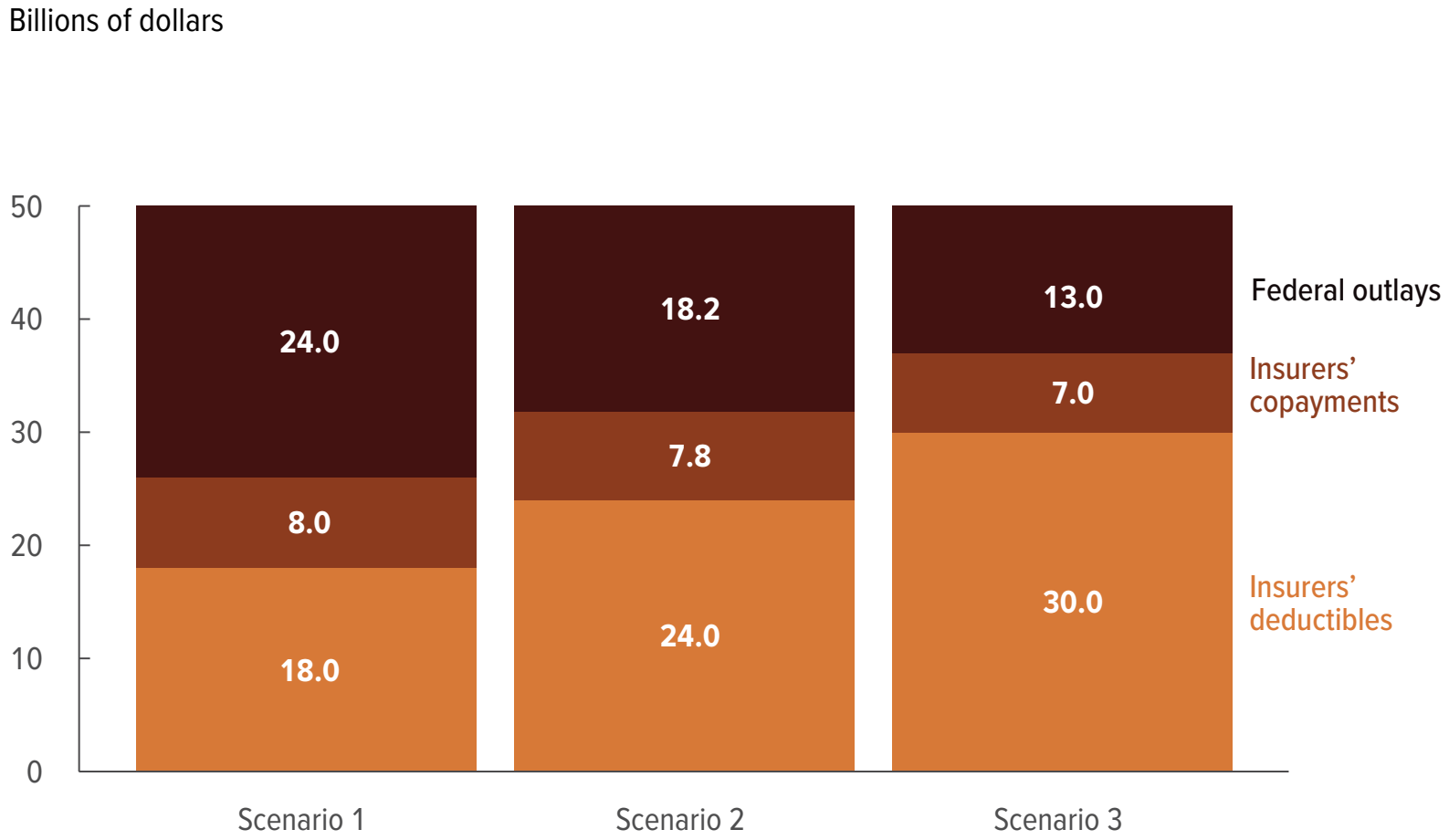



These scenarios illustrate how potential insured losses could be shared between insurance companies and the federal government. As insurers' deductibles and copayments increase, federal outlays decrease. To the extent that an insurance company had private reinsurance coverage, some portion of its deductible and copayments would be paid by the reinsurer.

Data source: Congressional Budget Office. See www.cbo.gov/publication/59918#data.

In all three scenarios, insured losses are $20 billion and prior year property and casualty premiums total $40 billion. In the first scenario, insurers' deductibles are set to 20 percent of the prior year's premiums and insurers' copayments amount to 20 percent of insured losses above that amount. In the second scenario, deductibles are 30 percent and copayments are 25 percent. In the third scenario, deductibles are 40 percent and copayments are 30 percent.

# Allocation of Potential Insured Losses of $50 Billion for Natural Disaster Risk Insurance: Three Scenarios

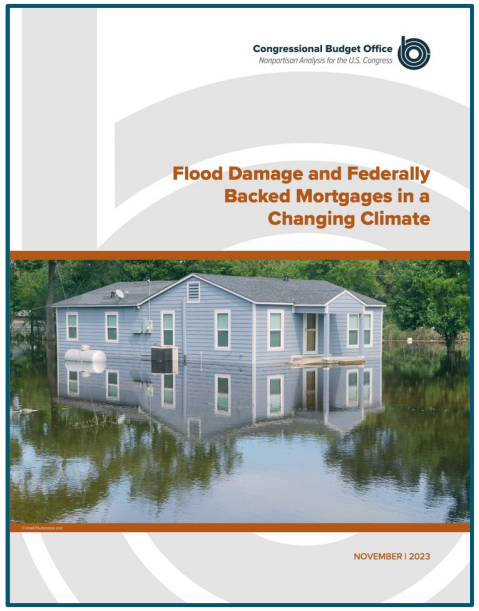


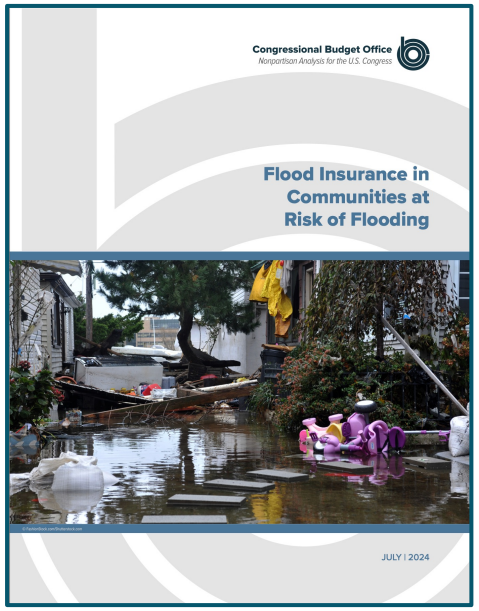

Natural disaster risks such as hurricanes, for which the cost of damages tends to be higher than for wildfires, could also be covered in a public-private risk-sharing program. In these scenarios, the federal government's reinsurance coverage starts when losses hit a higher trigger point to reflect the larger cost of damages, so private insurers would be responsible for a larger share of the damages.

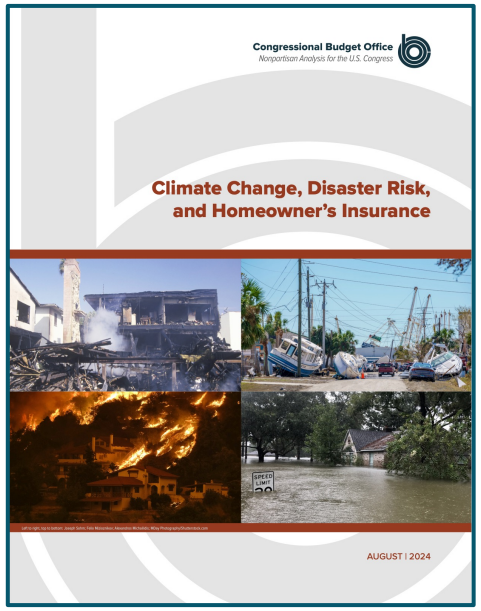
Data source: Congressional Budget Office. See www.cbo.gov/publication/59918#data.

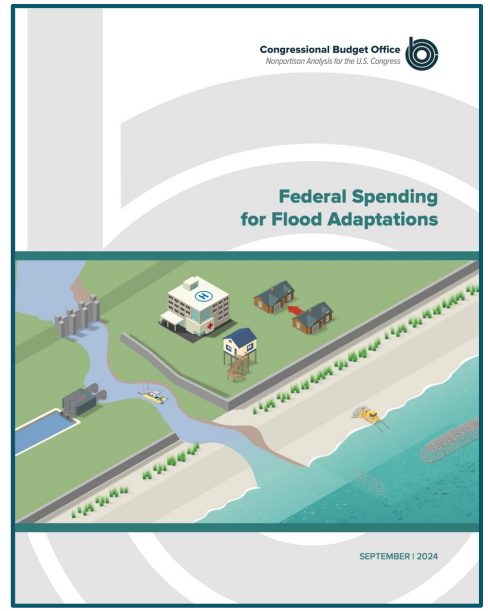
In all three scenarios, insured losses are $50 billion and prior year property and casualty premiums total $60 billion. In the first scenario, insurers' deductibles are set to 30 percent of the prior year's premiums and insurers' copayments amount to 25 percent of insured losses above that amount. In the second scenario, deductibles are 40 percent and copayments are 30 percent. In the third scenario, deductibles are 50 percent and copayments are 35 percent.

# CBO's Recent Work on Natural Disasters

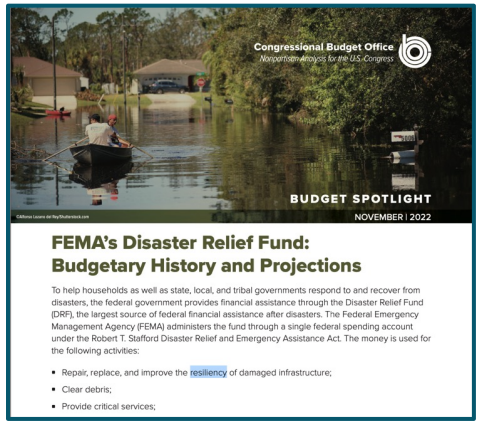



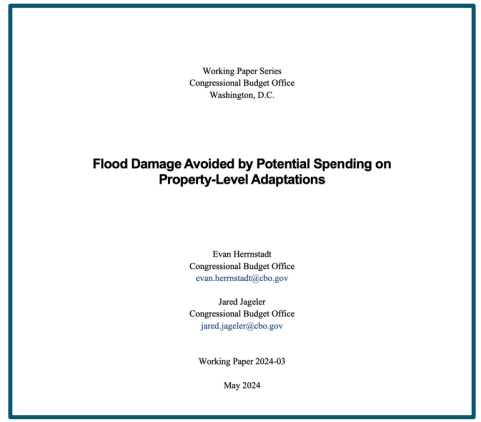



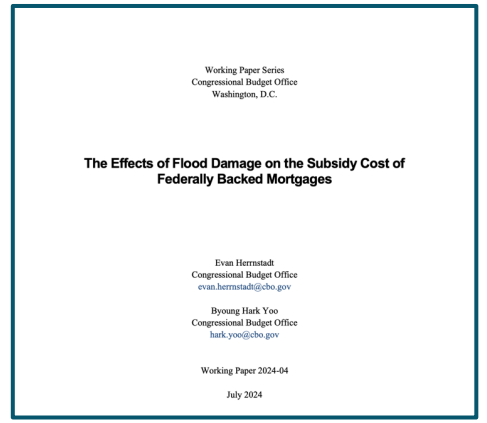





# Recent Related CBO Publications

- Congressional Budget Office, *Federal Spending for Flood Adaptations* (September 2024), www.cbo.gov/publication/59971.
  - CBO provides information about the amount of damage that could be reduced through spending for flood adaptations—projects aimed at preventing damage from flooding.
- Congressional Budget Office, *Climate Change, Disaster Risk, and Homeowner's Insurance* (August 2024), www.cbo.gov/publication/59918.
  - CBO analyzes recent changes in property insurance markets and considers alternative insurance products as well as policy approaches to increase the availability and affordability of insurance for homeowners and renters.
- Congressional Budget Office, *Flood Insurance in Communities at Risk of Flooding* (July 2024), www.cbo.gov/publication/60042.
  - CBO examines how the share of properties at risk of flooding that are covered by policies purchased through the National Flood Insurance Program varies across communities with different economic and demographic characteristics.
- Evan Herrnstadt and Byoung Hark Yoo, *The Effects of Flood Damage on the Subsidy Cost of Federally Backed Mortgages*, Working Paper 2024-04 (Congressional Budget Office, July 2024), www.cbo.gov/publication/60167.
  - This working paper uses data on mortgages and expected flood damage for each residential property in the United States to examine how much flood damage is expected to increase the cost of federally backed mortgages.
- Evan Herrnstadt and Jared Jageler, *Flood Damage Avoided by Potential Spending on Property-Level Adaptations*, Working Paper 2024-03 (Congressional Budget Office, May 2024), www.cbo.gov/publication/58168.
  - This working paper provides estimates of the flood damage avoided from property buyouts and elevations and analyzes how the effects of adaptation spending could vary across regions, by area income, and for different subsets of projects.

# Recent Related CBO Publications (Continued)

- Congressional Budget Office, *Flood Damage and Federally Backed Mortgages in a Changing Climate* (November 2023), www.cbo.gov/publication/59379.
  - CBO estimates the flood damage that homes with federally backed mortgages are expected to face in multiyear periods centered on 2020 and 2050 and analyzes where that damage is concentrated.
- Congressional Budget Office, *Communities at Risk of Flooding* (September 2023), www.cbo.gov/publication/58953.
  - CBO examines the variation in current and future flood risk across communities with different economic and demographic characteristics.
- Congressional Budget Office, *Army Corps of Engineers: Budgetary History and Projections* (November 2022), www.cbo.gov/publication/58415.
  - CBO examines trends in funding and spending for the Army Corps of Engineers and explains how CBO treats that agency's activities in its baseline and cost estimates.
- Congressional Budget Office, *FEMA's Disaster Relief Fund: Budgetary History and Projections* (November 2022), www.cbo.gov/publication/58420.
  - CBO examines trends in funding and spending for the Federal Emergency Management Agency's Disaster Relief Fund and provides information about how CBO treats that program in its baseline and cost estimates.
- Congressional Budget Office, *Wildfires* (June 2022), www.cbo.gov/publication/57970.
  - CBO analyzes trends in wildfire activity; considers the effects of wildfires on the federal budget, the environment, people's health, and the economy; and reviews forest-management practices meant to reduce fire-related disasters.