



Testimony

Before the Subcommittee on
Environment, Committee on Oversight
and Reform, House of Representatives

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CLIMATE CHANGE

**Potential Economic Costs
and Opportunities to
Reduce Federal Fiscal
Exposure**

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Resources and Environment

GAO Highlights

Highlights of [GAO-20-338T](#), a testimony before the Subcommittee on Environment, House Committee on Oversight and Reform.

Why GAO Did This Study

Since 2005, federal funding for disaster assistance is at least \$450 billion, including approximately \$19.1 billion in supplemental appropriations signed into law on June 6, 2019. In 2018 alone, there were 14 separate billion-dollar weather and climate disaster events across the United States, with a total cost of at least \$91 billion, according to the National Oceanic and Atmospheric Administration. The U.S. Global Change Research Program projects that disaster costs will likely increase as certain extreme weather events become more frequent and intense due to climate change.

The costs of recent weather disasters have illustrated the need for planning for climate change risks and investing in resilience. Resilience is the ability to prepare and plan for, absorb, recover from, and more successfully adapt to adverse events, according to the National Academies of Science, Engineering, and Medicine. Investing in resilience can reduce the need for far more costly steps in the decades to come.

Since February 2013, GAO has included *Limiting the Federal Government's Fiscal Exposure by Better Managing Climate Change Risks* on its list of federal program areas at high risk of vulnerabilities to fraud, waste, abuse, and mismanagement or most in need of transformation. GAO updates this list every 2 years. In March 2019, GAO reported that the federal government had not made measurable progress since 2017 to reduce fiscal exposure to climate change.

View [GAO-20-338T](#). For more information, contact J. Alfredo Gómez at (202) 512-3841 or gomezj@gao.gov.

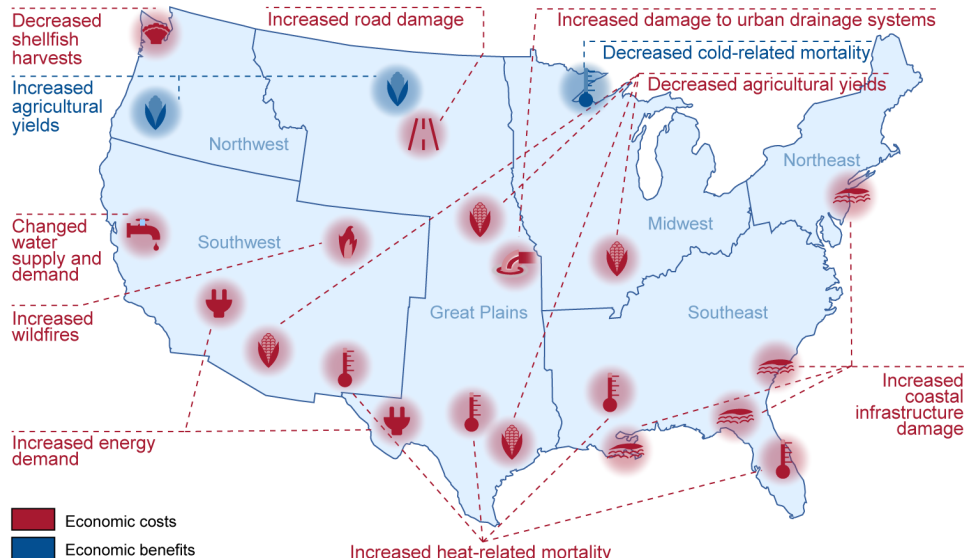
CLIMATE CHANGE

Potential Economic Costs and Opportunities to Reduce Federal Fiscal Exposure

What GAO Found

The estimated economic effects of climate change, while imprecise, can convey useful insight about potential damages in the United States. In September 2017, GAO reported that the potential economic effects of climate change could be significant and unevenly distributed across sectors and regions (see figure). This is consistent with the 2018 findings of the U.S. Global Change Research Program's Fourth National Climate Assessment, which concluded, among other things, that the continued increase in the frequency and extent of high-tide flooding due to sea level rise threatens America's trillion-dollar coastal infrastructure.

Examples of Potential Economic Effects from Climate Change by 2100



Sources: GAO analysis of Environmental Protection Agency, *Climate Change Impacts in the United States: Benefits of Global Action* (Washington, D.C.: 2015), and Solomon Hsiang et al., "Estimating Economic Damage from Climate Change in the United States," *Science*, vol. 356 (2017); Map Resources (map). | GAO-20-338T

Information about the potential economic effects of climate change could inform decision makers about significant potential damages in different U.S. sectors or regions. According to prior GAO work, this information could help decision makers identify significant climate risks as an initial step toward managing them.

The federal government faces fiscal exposure from climate change risks in several areas, including:

- **Disaster aid:** due to the rising number of natural disasters and increasing reliance on federal assistance. GAO has previously reported that the federal government's fragmented and reactive approach to funding disaster resilience presented challenges to effective reduction of climate-related risks. GAO has also reported that, due to an artificially low indicator for determining a jurisdiction's ability to respond to disasters that was set in 1986, the

This testimony—based on reports GAO issued from October 2009 to October 2019—discusses 1) what is known about the potential economic effects of climate change in the United States and the extent to which this information could help federal decision makers manage climate risks across the federal government, (2) the fiscal exposure facing the federal government due to climate risks and current efforts to address that exposure, (3) the extent to which the federal government has invested in resilience to climate change impacts, and (4) how the federal government could reduce fiscal exposure to the effects of climate change.

GAO had made 62 recommendations related to the *Limiting the Federal Government's Fiscal Exposure by Better Managing Climate Change Risks* high-risk area. As of December 2018, 25 of those recommendations remained open.

Federal Emergency Management Agency risks recommending federal assistance for jurisdictions that could recover on their own.

- **Federal insurance for property and crops:** due, in part, to the vulnerability of insured property and crops to climate change impacts. Federal flood and crop insurance programs were not designed to generate sufficient funds to fully cover all losses and expenses. The flood insurance program, for example, was about \$21 billion in debt to the Treasury as of April 2019. Further, the Congressional Budget Office estimated in May 2019 that federal crop insurance would cost the federal government an average of about \$8 billion annually from 2019 through 2029.
- **Operation and management of federal property and lands:** due to the hundreds of thousands of federal facilities and millions of acres of land that could be affected by a changing climate and more frequent extreme events. For example, in 2018, Hurricane Michael devastated Tyndall Air Force Base in Florida, with a preliminary repair estimate of \$3 billion.

As we reported in October 2019, our past work shows an absence of government-wide strategic planning for climate change. Specifically, our past work has identified limitations related to strategic planning for climate change that includes a lack of coordination, prioritization, and consolidation of strategic priorities. In our March 2019 High-Risk Update, we assessed the federal government's progress since 2017 related to climate change strategic planning against five criteria and found that the federal government had not met any of the criteria for removal from the high-risk list.

Federal investments in resilience to reduce fiscal exposures have been limited. As GAO has reported, enhancing resilience can reduce fiscal exposure by reducing or eliminating long-term risk to people and property from natural hazards. For example, a 2018 interim report by the National Institute of Building Sciences estimated approximate benefits to society in excess of costs for several types of resilience projects. While precise benefits are uncertain, the report estimated that for every dollar invested in designing new buildings to particular design standards, society could accrue benefits amounting to about \$11 on average.

GAO's March 2019 High-Risk report identified a number of recommendations GAO has made related to fiscal exposure to climate change. The federal government could reduce its fiscal exposure by implementing these recommendations. Among GAO's key government-wide recommendations are:

- Entities within the Executive Office of the President (EOP) should work with partners to establish federal strategic climate change priorities that reflect the full range of climate-related federal activities;
- Entities within EOP should use information on potential economic effects from climate change to help identify significant climate risks and craft appropriate federal responses;
- Entities within EOP should designate a federal entity to develop and update a set of authoritative climate observations and projections for use in federal decision making, and create a national climate information system with defined roles for federal agencies and certain nonfederal entities; and
- The Department of Commerce should convene federal agencies to provide the best-available forward-looking climate information to organizations that develop standards and building codes to enhance infrastructure resilience.

Further, in October 2019, GAO reported that Congress could consider establishing a federal organizational arrangement to periodically identify and prioritize climate resilience projects for federal investment. GAO also issued the Disaster Resilience Framework to serve as a guide for analysis of federal action to facilitate and promote resilience to natural disasters, including resilience to climate change.

Chairman Rouda, Ranking Member Comer, and Members of the Subcommittee:

Thank you for the opportunity to discuss our work on how to limit the federal government's fiscal exposure by better managing climate change risks, an area that has been on our High-Risk List since February 2013.¹ Addressing climate change risks requires advanced planning and investment to reduce the need for far more costly steps in the decades to come, which, as we have previously reported, the federal government is not well organized to do. The costs associated with recent disasters have illustrated the need for such planning and investment. In 2018 alone, there were 14 separate billion-dollar weather and climate disaster events across the United States, with a total cost of at least \$91 billion, according to the National Oceanic and Atmospheric Administration (NOAA).² Further, on June 6, 2019, a supplemental appropriation of approximately \$19.1 billion was signed into law for recent disasters.³

The U.S. Global Change Research Program (USGCRP), which coordinates and integrates the activities of 13 federal agencies that research changes in the global environment and their implications for society, reported in its November 2018 Fourth National Climate Assessment that climate change is playing a role in the increasing frequency of some types of extreme weather that lead to the billion-dollar disasters.⁴ These changes include the rise in vulnerability to drought, lengthening wildfire seasons, and potential for extremely heavy rainfall becoming more common in some regions. USGCRP reported in the prior assessment that the costs of many of these disasters will likely increase

¹Our High-Risk List identifies federal program areas that are at high risk of vulnerabilities to fraud, waste, abuse, and mismanagement or most in need of transformation. See GAO, *High-Risk Series: An Update*, [GAO-13-283](#) (Washington, D.C.: February 2013).

²National Oceanic and Atmospheric Administration, National Centers for Environmental Information, *U.S. Billion-Dollar Weather and Climate Disasters (2019)*, accessed June 3, 2019, <https://www.ncdc.noaa.gov/billions/time-series>.

³Pub. L. No. 116-20, 133 Stat. 871 (2019).

⁴D.R. Reidmiller, C.W. Avery, D. R. Easterling, K. E. Kunkel, K. L. M. Lewis, T. K. Maycock, and B. C. Stewart (eds.), *2018: Impacts, Risks, and Adaptation in the United States: Fourth National Climate Assessment, Volume II* (Washington, D.C.: U.S. Global Change Research Program, November 2018). Under the Global Change Research Act of 1990 (Pub. L. No. 101-606, § 103 (1990)), USGCRP is to periodically prepare a scientific assessment—known as the National Climate Assessment—which is an important resource for understanding and communicating climate change science and impacts in the United States. The Office of Science and Technology Policy within the Executive Office of the President oversees USGCRP.

as extreme weather events become more frequent and intense with climate change.⁵

In my testimony today, I will discuss (1) what is known about the potential economic effects of climate change in the United States and the extent to which this information could help federal decision makers manage climate risks across the federal government, (2) the fiscal exposure facing the federal government due to climate risks and current efforts to address that exposure, (3) the extent to which the federal government has invested in resilience to climate change impacts,⁶ and (4) how the federal government could reduce fiscal exposure to the effects of climate change. My testimony is based on reports we issued from October 2009 to October 2019. More detailed information on our objectives, scope, and methodology can be found in those reports.

The work upon which this statement is based was conducted in accordance with generally accepted government auditing standards. Those standards require that we plan and perform the audit to obtain sufficient, appropriate evidence to provide a reasonable basis for our findings and conclusions based on our audit objectives. We believe that the evidence obtained provides a reasonable basis for our findings and conclusions based on our audit objectives.

⁵Jerry M. Melillo, Terese (T.C.) Richmond, and Gary W. Yohe, eds., *Climate Change Impacts in the United States: The Third National Climate Assessment* (Washington, D.C.: U.S. Global Change Research Program, May 2014).

⁶The National Academies of Sciences, Engineering, and Medicine define resilience as the ability to prepare and plan for, absorb, recover from, and more successfully adapt to adverse events. See the National Academies, Committee on Increasing National Resilience to Hazards and Disasters and Committee on Science, Engineering, and Public Policy, *Disaster Resilience: A National Imperative* (Washington, D.C.: 2012). We reported in May 2016 that two related sets of actions can enhance resilience by reducing risk: climate change adaptation and predisaster hazard mitigation. Adaptation is defined as adjustments to natural or human systems in response to actual or expected climate change. Predisaster hazard mitigation refers to actions taken to reduce the loss of life and property by lessening the impacts of adverse events and applies to all hazards, including terrorism and natural hazards, such as health pandemics or weather-related disasters. In this testimony, we use “resilience” for consistency and to encompass both of these sets of actions as they relate to addressing climate risks. GAO, *Climate Change: Selected Governments Have Approached Adaptation through Laws and Long-Term Plans*, [GAO-16-454](#) (Washington, D.C.: May 12, 2016).

Information on the Potential Economic Effects of Climate Change in the United States Could Help Federal Decision Makers Better Manage Climate Risks

We reported in September 2017 that while estimates of the economic effects of climate change are imprecise due to modeling and information limitations, they can convey useful insight into broad themes about potential damages in the United States.⁷ We also reported that according to the two national-scale studies available at the time that examined the economic effects of climate change across U.S. sectors, potential economic effects could be significant and these effects will likely increase over time for most of the sectors analyzed.⁸ For example, for 2020 through 2039, one of the studies estimated from \$4 billion to \$6 billion in annual coastal property damages from sea level rise and more frequent and intense storms.⁹

In addition, the national-scale studies we reviewed and several experts we interviewed for the September 2017 report suggested that potential economic effects could be unevenly distributed across sectors and regions. For example, one of the studies estimated that the Southeast, Midwest, and Great Plains regions will likely experience greater combined economic effects than other regions, largely because of coastal property damage in the Southeast and changes in crop yields in the Midwest and

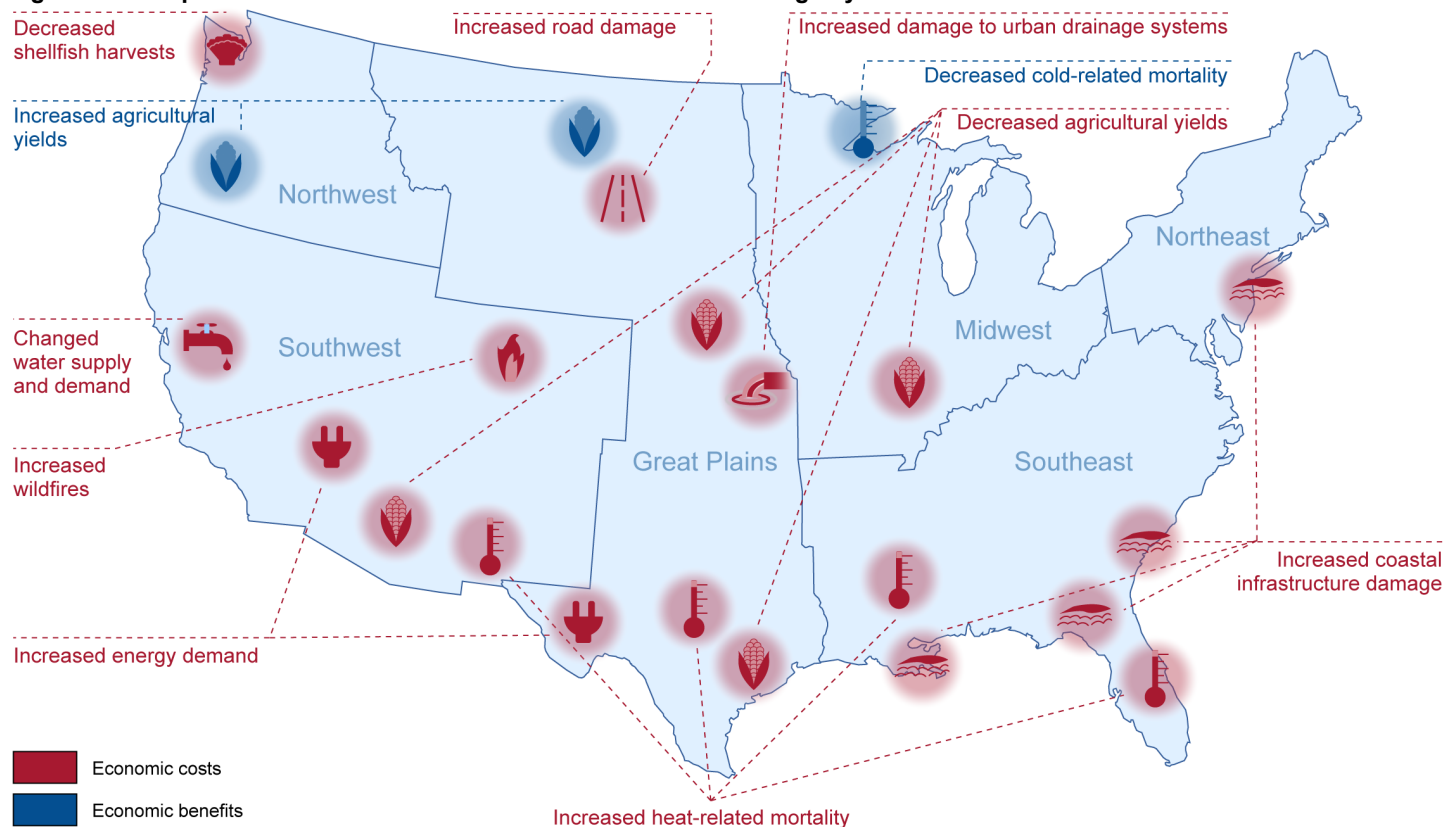
⁷GAO, *Climate Change: Information on Potential Economic Effects Could Help Guide Federal Efforts to Reduce Fiscal Exposure*, [GAO-17-720](#) (Washington, D.C.: Sept. 28, 2017).

⁸These national-scale studies were the Environmental Protection Agency's (EPA) *Climate Change Impacts and Risk Analysis*—a summary study of an ongoing EPA project—and the Rhodium Group's *American Climate Prospectus*. See Environmental Protection Agency, Office of Atmospheric Programs, *Climate Change in the United States: Benefits of Global Action*, EPA 430-R-15-001 (Washington, D.C.: 2015). The EPA project on which the summary study was based was coordinated by EPA's Office of Atmospheric Programs—Climate Change Division, with contributions from national laboratories and the academic and private sectors. The detailed methods and results of the project were published in a 2014 special issue of the peer-reviewed journal, *Climatic Change* entitled, "A Multi-Model Framework to Achieve Consistent Evaluation of Climate Change Impacts in the United States." An update to this project was used in the 2018 Fourth National Climate Assessment. Also see Rhodium Group, LLC, *American Climate Prospectus: Economic Risks in the United States* (New York: October 2014). The *American Climate Prospectus* was funded by the Risky Business Project, a project funded by Bloomberg Philanthropies, the Paulsen Institute, and TomKat Charitable Trust; the Skoll Global Threats Fund; and the Rockefeller Family Fund. The Rhodium Group, LLC, a research consultancy and advisory company, coordinated the effort, which involved authors from universities and the private sector. This study was later published by the Columbia University Press in 2015: Trevor Houser et al., *Economic Risks of Climate Change: An American Prospectus* (New York: Columbia University Press, 2015). An update to this analysis was published in *Science* in June 2017: Solomon Hsiang et al. "Estimating Economic Damage from Climate Change in the United States," *Science*, vol. 356 (2017).

⁹Rhodium Group, *American Climate Prospectus*.

Great Plains (see fig. 1).¹⁰ This is consistent with the findings of the Fourth National Climate Assessment.¹¹ For example, according to that assessment, the continued increase in the frequency and extent of high-tide flooding due to sea level rise threatens America's trillion-dollar coastal property market and public infrastructure sector.

Figure 1: Examples of Potential Economic Effects from Climate Change by 2100



Sources: GAO analysis of Environmental Protection Agency, *Climate Change Impacts in the United States: Benefits of Global Action* (Washington, D.C.: 2015), and Solomon Hsiang et al., "Estimating Economic Damage from Climate Change in the United States," *Science*, vol. 356 (2017); Map Resources (map). | GAO-20-338T

As we reported in September 2017, information on the potential economic effects of climate change could help federal decision makers better manage climate risks, according to leading practices for climate risk management, economic analysis we reviewed, and the views of several

¹⁰Rhodium Group, *American Climate Prospectus*.

¹¹D.R. Reidmiller et al., *Fourth National Climate Assessment, Volume II*.

experts we interviewed.¹² For example, such information could inform decision makers about significant potential damages in different U.S. sectors or regions. According to several experts and our prior work, this information could help federal decision makers identify significant climate priorities as an initial step toward managing climate risks.¹³ Such a first step is consistent with leading practices for climate risk management and federal standards for internal control.¹⁴ For example, leading practices from the National Academies call for climate change risk management efforts that focus on where immediate attention is needed.¹⁵ As noted in our September 2017 report, according to a 2010 National Academies report, other literature we reviewed, and several experts we interviewed, to make informed choices, decision makers need more comprehensive information on economic effects to better understand the potential costs of climate change to society and begin to develop an understanding of the benefits and costs of different options for managing climate risks.¹⁶

¹²In that report, we also found that additional economic information could help federal, state, local, and private sector decision makers manage climate risks that drive federal fiscal exposure. [GAO-17-720](#).

¹³[GAO-17-720](#).

¹⁴National Research Council of the National Academies, America's Climate Choices: Panel on Adapting to the Impacts of Climate Change, *Adapting to the Impacts of Climate Change* (Washington, D.C.: 2010), and GAO, *Standards for Internal Control in the Federal Government*, [GAO-14-704G](#) (Washington, D.C.: September 2014).

¹⁵National Research Council of the National Academies, America's Climate Choices: Panel on Adapting to the Impacts of Climate Change, *Adapting to the Impacts of Climate Change*.

¹⁶[GAO-17-720](#).

The Federal Government Faces Fiscal Exposure from Climate Change Risks, but Our Past Work Shows an Absence of Government-Wide Strategic Planning

The federal government faces fiscal exposure from climate change risks in a number of areas, and this exposure will likely increase over time, as we concluded in September 2017.¹⁷ In the March 2019 update to our High-Risk List, we summarized our previous work that identified several of these areas across the federal government, including programs related to the following:¹⁸

- **Disaster aid.** The rising number of natural disasters and increasing reliance on federal assistance are a key source of federal fiscal exposure, and this exposure will likely continue to rise. Since 2005, federal funding for disaster assistance has been at least \$450 billion.¹⁹ In September 2018, we reported that four hurricane and wildfire disasters in 2017 created an unprecedented demand for federal disaster resources and that Hurricanes Harvey, Irma, and Maria ranked among the top five costliest hurricanes on record.²⁰ Subsequently, the fall of 2018 brought additional catastrophic

¹⁷[GAO-17-720](#).

¹⁸We have identified other areas with potential links to climate and the federal budget in past reports, including global migration, state and local infrastructure, federal supply chains, and public health. See GAO, *Climate Change: Activities of Selected Agencies to Address Potential Impact on Global Migration*, [GAO-19-166](#) (Washington, D.C.: Jan. 17, 2019); *Climate Information: A National System Could Help Federal, State, Local, and Private Sector Decision Makers Use Climate Information*, [GAO-16-37](#) (Washington, D.C.: Nov. 23, 2015); *Federal Supply Chains: Opportunities to Improve the Management of Climate-Related Risks*, [GAO-16-32](#) (Washington, D.C.: Oct. 13, 2015); and *Climate Change: HHS Could Take Further Steps to Enhance Understanding of Public Health Risks*, [GAO-16-122](#) (Washington, D.C.: Oct. 5, 2015). We also have ongoing work in many areas related to federal fiscal exposure to climate change, examining issues such as how to identify and prioritize resilience projects to build resilience to climate change impacts, how to make water infrastructure more resilient to the impacts of climate change, and how to help communities voluntarily relocate to avoid climate change impacts.

¹⁹This total includes, for fiscal years 2005 through 2014, \$278 billion that GAO found that the federal government had obligated for disaster assistance. See GAO, *Federal Disaster Assistance: Federal Departments and Agencies Obligated at Least \$277.6 Billion during Fiscal Years 2005 through 2014*, [GAO-16-797](#) (Washington, D.C.: Sept. 22, 2016). It also includes, for fiscal years 2015 through 2018, \$124 billion in select supplemental appropriations to federal agencies for disaster assistance, with approximately \$7 billion in annual appropriations to the Disaster Relief Fund (a total of \$28 billion for the 4-year period). For fiscal years 2015 through 2018, it does not include other annual appropriations to federal agencies for disaster assistance. Lastly, on June 6, 2019, the Additional Supplemental Appropriations for Disaster Relief Act of 2019 was signed into law, which provides approximately \$19.1 billion for disaster assistance. Pub. L. No. 116-20, 133 Stat. 871 (2019).

²⁰GAO, *2017 Hurricanes and Wildfires: Initial Observations on the Federal Response and Key Recovery Challenges*, [GAO-18-472](#) (Washington, D.C.: Sept. 4, 2018).

disasters such as Hurricanes Florence and Michael and devastating California wildfires, with further needs for federal disaster assistance. Disaster costs are projected to increase as certain extreme weather events become more frequent and intense due to climate change—as USGCRP observed and projected.²¹ We reported in July 2015 that the federal government’s fragmented and reactive approach to funding disaster resilience presented challenges to effective reduction of climate-related risks.²² In addition, our prior work found that the Federal Emergency Management Agency’s (FEMA) primary indicator for determining whether to recommend that a jurisdiction receive disaster assistance—which was set in 1986—is artificially low because it does not accurately reflect the ability of state and local governments to respond to disasters.²³ Without an accurate assessment of a jurisdiction’s capability to respond to a disaster without federal assistance, we found that FEMA runs the risk of recommending that the President award federal assistance to jurisdictions that have the capability to respond and recover on their own.

- **Federal insurance for property and crops.** The National Flood Insurance Program (NFIP) and the Federal Crop Insurance Corporation are sources of federal fiscal exposure due, in part, to the vulnerability of insured property and crops to climate change.²⁴ These

²¹Melillo et al., *Climate Change Impacts in the United States: The Third National Climate Assessment*.

²²For example, from fiscal years 2011 to 2014, the Federal Emergency Management Agency obligated more than \$3.2 billion for the Hazard Mitigation Grant Program for postdisaster hazard mitigation while obligating approximately \$222 million for the Pre-Disaster Mitigation Grant Program. GAO, *Hurricane Sandy: An Investment Strategy Could Help the Federal Government Enhance National Resilience for Future Disasters*, [GAO-15-515](#) (Washington, D.C.: July 30, 2015).

²³GAO, *Federal Disaster Assistance: Improved Criteria Needed to Assess a Jurisdiction’s Capability to Respond and Recover on Its Own*, [GAO-12-838](#) (Washington, D.C.: Sept. 12, 2012). We recommended, among other things, that FEMA develop and implement a methodology that more comprehensively assesses a jurisdiction’s capacity to respond to and recover from a disaster without federal assistance, including fiscal capacity and consideration of response and recovery capabilities. The Disaster Recovery Reform Act of 2018 includes a provision directing the FEMA Administrator to initiate rulemaking to update the factors considered when evaluating requests for major disaster declarations. Pub. L. No. 115-254, div. D, § 1239, 132 Stat. at 3466 (2018). According to FEMA documentation, as of September 2019, the agency was working to implement this provision through rulemaking proposals, including increasing the per capita indicator to account for inflation.

²⁴NFIP is administered by FEMA within the U.S. Department of Homeland Security, and the Federal Crop Insurance Corporation is administered by the Risk Management Agency within the U.S. Department of Agriculture.

programs provide coverage where private markets for insurance do not exist, typically because the risk associated with the property or crops is too great to privately insure at a cost that buyers are willing to accept. From 2013 to 2017, losses paid under NFIP and the federal crop insurance program totaled \$51.3 billion.²⁵ Federal flood and crop insurance programs were not designed to generate sufficient funds to fully cover all losses and expenses, which means the programs need budget authority from Congress to operate. NFIP, for example, was about \$21 billion in debt to the Department of the Treasury as of April 2019.²⁶ Further, the Congressional Budget Office estimated in May 2019 that federal crop insurance would cost the federal government an average of about \$8 billion annually from 2019 through 2029.²⁷

Operation and management of federal property and lands. The federal government owns and operates hundreds of thousands of facilities and manages millions of acres of land that could be affected by a changing climate and represent a significant federal fiscal exposure. For example, the Department of Defense (DOD) owns and operates domestic and overseas infrastructure with an estimated replacement value of about \$1 trillion. In September 2018, Hurricane Florence damaged Camp Lejeune and other Marine Corps facilities in North Carolina, resulting in a preliminary Marine Corps repair estimate of \$3.6 billion. One month later, Hurricane Michael devastated Tyndall Air Force Base in Florida, resulting in a preliminary Air Force repair estimate of \$3 billion and upwards of 5 years to complete the work. In addition, we recently reported that the federal government manages about 650 million acres of land in the United States that could be vulnerable to climate change, including the possibility of more frequent and severe droughts and wildfires.²⁸ Appropriations for federal wildland fire management activities have increased

²⁵This figure is based on FEMA and Risk Management Agency published data. This does not include the costs of running these programs or the premiums collected to partially offset the costs. Losses for the crop insurance program are losses associated with crops harvested in that year, also known as crop year.

²⁶Department of the Treasury, Bureau of the Fiscal Service, *Monthly Treasury Statement, Table 6, Schedule C* (Washington, D.C.: April 2019).

²⁷Congressional Budget Office, *CBO's May 2019 Baseline for Farm Programs* (Washington, D.C.: May 2, 2019).

²⁸GAO, *Climate Change: Various Adaptation Efforts Are Under Way at Key Natural Resource Management Agencies*, [GAO-13-253](#) (Washington, D.C.: May 31, 2013).

considerably since the 1990s, as we and the Congressional Research Service have reported.²⁹

As we reported in October 2019, our past work shows an absence of government-wide strategic planning for climate change.³⁰ Specifically, our past work identifies limitations related to strategic planning for climate change that include a lack of coordination, prioritization, and consolidation of strategic priorities. For example, we reported in October 2009 that the federal government's emerging climate resilience activities were carried out in an ad hoc manner and were not well coordinated across federal agencies.³¹ In May 2011, we reported that federal officials did not have a shared understanding of strategic government-wide priorities related to climate change.³² In the same report, we found that there was not a consolidated set of strategic priorities integrating climate change programs and activities across the federal government.

In our March 2019 High-Risk Update, we reported that one area of government-wide action needed to reduce federal fiscal exposure is in the federal government's role as the leader of a strategic plan that coordinates federal efforts and informs state, local, and private sector action.³³ For our 2019 High-Risk Update, we assessed the federal government's progress since 2017 related to climate change strategic planning against five criteria and found that the federal government had

²⁹GAO, *Budget Issues: Opportunities to Reduce Federal Fiscal Exposures Through Greater Resilience to Climate Change and Extreme Weather*, [GAO-14-504T](#) (Washington, D.C.: July 29, 2014), and Congressional Research Service, *Wildfire Suppression Spending: Background, Issues, and Legislation in the 115th Congress*, R44966 (Washington, D.C.: Nov. 8, 2017).

³⁰GAO, *Climate Resilience: A Strategic Investment Approach for High-Priority Projects Could Help Target Federal Resources*, [GAO-20-127](#) (Washington, D.C.: Oct. 23, 2019). Several federal agencies prepared climate change adaptation plans that outline strategies to reduce the vulnerability of federal programs, assets, and investments to the impacts of climate change. These plans were prepared in response to the 2013 Executive Order 13653, *Preparing the United States for the Impacts of Climate Change*, which has been rescinded. These plans were agency specific and do not represent a government-wide strategic planning effort for climate change.

³¹GAO, *Climate Change Adaptation: Strategic Federal Planning Could Help Government Officials Make More Informed Decisions*, [GAO-10-113](#) (Washington, D.C.: Oct. 7, 2009).

³²GAO, *Climate Change: Improvements Needed to Clarify National Priorities and Better Align Them with Federal Funding Decisions*, [GAO-11-317](#) (Washington, D.C.: May 20, 2011).

³³GAO, *High-Risk Series: Substantial Efforts Needed to Achieve Greater Progress on High-Risk Areas*, [GAO-19-157SP](#) (Washington, D.C.: Mar. 6, 2019).

not met any of the criteria for removal from the high-risk list.³⁴ Specifically, since our 2017 high-risk update, four ratings regressed to “not met” and one remained unchanged as “not met.” (See fig. 2.) We have made 62 recommendations related to the climate change high-risk area, 17 of which address improving federal climate change strategic planning. As of August 2019, no action had been taken toward 14 of those 17 recommendations—one dating back to 2003.³⁵

³⁴Every 2 years, at the start of a new Congress, GAO reevaluates agency progress in addressing issues on the High-Risk List against five criteria to determine if progress has been made. The criteria are (1) leadership commitment to address the risk, (2) agency capacity to resolve the risk, (3) a corrective action plan to addressing the risk, (4) a program to monitor the effectiveness of corrective measures, and (5) ability to demonstrate progress in resolving the high-risk area. GAO-13-283.

³⁵Based on the most current information available as of August 2019, of the 17 recommendations related to strategic planning, 11 were closed as not implemented, three were closed as implemented, and three remain open.

Figure 2: Federal Progress since 2017 Related to Climate Change Strategic Planning

GAO’s High-Risk List

Since the early 1990s, GAO’s high-risk list has called attention to agencies and program areas that are at high risk due to their vulnerabilities to fraud, waste, abuse, and mismanagement, or are most in need of transformation. Every 2 years at the start of a new Congress, GAO reevaluates agency progress in addressing issues on the high-risk list against five criteria to determine if progress has been made. The criteria are (1) leadership commitment to address the risk, (2) agency capacity to resolve the risk, (3) a corrective action plan for addressing the risk, (4) a program to monitor the effectiveness of corrective measures, and (5) ability to demonstrate progress in resolving the high-risk area.

• **Leadership commitment:** not met. A March 2017 Executive Order (E.O. 13783) revoked policies, including the Climate Action Plan and a 2013 Executive Order (E.O. 13653), that we previously found had demonstrated leadership support for reducing aspects of fiscal exposure to climate change.^a

• **Capacity:** not met. A May 2018 Executive Order (E.O. 13834) revoked a 2013 Executive Order (E.O. 13693), which we had previously found partially met this criterion.^b Specifically, E.O. 13693 had directed the Office of Personnel Management to include resilience in federal training and also directed the creation of interagency workgroups to address, among other things, resilience planning in coordination with states and other stakeholders.

• **Action plan:** not met. The two aforementioned executive orders (13783 and 13834) withdrew previous direction to develop resilience plans and strategic sustainability performance plans that identified agency actions to prepare for climate change impacts and improve resilience.^c

• **Monitoring:** not met. Executive orders 13783 and 13834 also eliminated monitoring mechanisms that we previously found had partially met this criterion. Specifically, E.O. 13783 revoked

E.O. 13653, which had directed agencies to submit resilience plans to Council on Environmental Quality and the Office of Management and Budget (OMB) for review, and E.O. 13834 revoked E.O. 13693, which had directed OMB to evaluate agencies’ strategic sustainability performance.

• **Demonstrating progress:** not met. The federal government has not implemented key recommendations in this area. This includes (1) a May 2011 recommendation to develop a strategic plan to guide the nation’s efforts to adapt to climate change that includes clear federal priorities that reflect the full range of climate-related federal activities and that establishes clear roles, responsibilities, and working relationships among federal, state, and local governments; (2) a September 2017 recommendation to use information on potential economic effects from climate change to help identify significant climate risks and craft appropriate federal responses; and (3) an April 2018 recommendation to provide information on fiscal exposures related to climate change

to Congress in conjunction with future reports on climate change funding.^d As of our 2019 update to our high-risk list, the Executive Office of the President and OMB had not implemented any of these recommendations.^e



Source: GAO-19-157SP (GAO High Risk Series: Substantial Efforts Needed to Achieve Greater Progress on High-Risk Areas). | GAO-20-338T

^aExecutive Order 13783, *Promoting Energy Independence and Economic Growth* (Mar. 28, 2017). Executive Order 13653, *Preparing the United States for the Impacts of Climate Change* (revoked) (Nov. 6, 2013).

^bExecutive Order 13834, *Efficient Federal Operations* (May 17, 2018). Executive Order 13693, *Planning for Federal Sustainability in the Next Decade* (revoked) (Mar. 19, 2015).

^cThe Mitigation Framework Leadership Group, an intergovernmental coordinating body, finalized the National Mitigation Investment Strategy in August 2019. However, as noted, our review of the strategy indicates that it does not include a detailed strategic approach to prioritize investments for disaster risk reduction that explicitly accounts for future climate change risks. According to Federal Emergency Management Agency officials, the strategy sets goals and recommendations that set the stage for developing approaches to address changing conditions.

Federal Investments in Resilience to Climate Change Impacts Have Been Limited

^dGAO, *Climate Change: Improvements Needed to Clarify National Priorities and Better Align Them with Federal Funding Decisions*, [GAO-11-317](#) (Washington, D.C.: May 20, 2011); *Climate Change: Information on Potential Economic Effects Could Help Guide Federal Efforts to Reduce Fiscal Exposure*, [GAO-17-720](#) (Washington, D.C.: Sept. 28, 2017); and *Climate Change: Analysis of Reported Federal Funding*, [GAO-18-223](#) (Washington, D.C.: Apr. 30, 2018).

^eGAO, *High-Risk Series: Substantial Efforts Needed to Achieve Greater Progress on High-Risk Areas*, [GAO-19-157SP](#) (Washington, D.C.: Mar. 6, 2019).

Although the federal government faces fiscal exposure to climate change, its investments in resilience to climate change impacts have been limited. One way to reduce federal fiscal exposure is to enhance resilience by reducing or eliminating long-term risk to people and property from natural hazards. For example, in September 2018 we reported that elevated homes and strengthened building codes in Texas and Florida prevented greater damages during the 2017 hurricane season.³⁶ In addition, one company participating in a 2014 forum we held on preparing for climate-related risks noted that for every dollar it invested in resilience efforts, the company could prevent \$5 in potential losses.³⁷ Finally, a 2018 interim report by the National Institute of Building Sciences examined a sample of federal grants for hazard mitigation. The interim report estimated approximate benefits to society (i.e., homeowners and communities) in excess of costs for several types of resilience projects through the protection of lives and property, and prevention of other losses, though precise benefits are uncertain.³⁸ According to the interim report, for every

³⁶Specifically, FEMA officials said Hurricane Harvey demonstrated how prior hazard mitigation projects prevented greater damages (e.g., elevated homes and equipment sustained less damage). FEMA officials said Florida strengthened its building codes for resilience as a result of Hurricane Andrew in 1992 and Hurricane Matthew in 2016. [GAO-18-472](#).

³⁷GAO, *Highlights of a Forum: Preparing for Climate-Related Risks: Lessons from the Private Sector*, [GAO-16-126SP](#) (Washington, D.C.: Nov. 19, 2015).

³⁸Benefit estimates from federal grants convey the magnitude of potential long-term benefits to society, primarily homeowners and local residents, and are not precise estimates. This interim report analyzes a small sample of projects for high-risk buildings selected with specific criteria to examine hazard mitigation grants awarded by FEMA, the Economic Development Administration, and the Department of Housing and Urban Development from 1993 to 2016 to address various hazards. Extrapolation to a broader set of grants needs to be interpreted in the context of the selected sample. These hazards included fires at the wildland-urban interface (i.e., fires in areas where homes are built near or among lands prone to wildland fire), hurricane-force and tornado-force winds, and riverine floods (i.e., floods that occur when river flows exceed the capacity of the river channel). See Multihazard Mitigation Council, a council of the National Institute of Building Sciences, *Natural Hazard Mitigation Saves: 2018 Interim Report* (Washington, D.C.: December 2018).

grant dollar the federal government spent on resilience projects, over time, society is estimated to accrue benefits amounting to the following:

- About \$3 on average from projects addressing the effects of fire in the wildland urban interface, with most benefits (approximately 70 percent) coming from the protection of property (i.e., avoiding property losses).
- About \$5 on average from projects to address hurricane-force and tornado-force winds, with most benefits (approximately 90 percent) coming from the protection of lives. This includes avoiding deaths, nonfatal injuries, and causes of posttraumatic stress.
- About \$7 on average from projects that buy out buildings prone to riverine flooding, with most benefits (approximately 65 percent) coming from the protection of property.

The interim report also projected that society could accrue benefits amounting to about \$11 on average for every dollar invested in designing new buildings to meet the 2018 International Building Code and the 2018 International Residential Code—the model building codes that the International Code Council developed—with most benefits (46 percent) coming from the protection of property.³⁹

We reported in October 2009 that the federal government’s activities to build resilience to climate change were carried out in an ad hoc manner and were not well coordinated across federal agencies.⁴⁰ We reported similar findings in October 2019.⁴¹ Federal agencies have included some of these activities within existing programs and operations—a concept known as mainstreaming. For example, the Fourth National Climate Assessment reported that the U.S. military integrates climate risks into its analysis, plans, and programs, with particular attention paid to climate

³⁹The benefit-cost ratios cited in the interim report are based on a relatively narrow set of disaster-loss data, and the report is not comprehensive. Benefits are estimated using many assumptions at all stages of the analysis and are subject to a high degree of model uncertainty and sensitivity. The International Code Council is a member-focused association with over 64,000 members dedicated to developing model codes and standards for use in the design, build, and compliance process to construct safe, sustainable, affordable, and resilient structures. The report used a baseline of buildings constructed to a prior generation of codes represented by 1990s-era design and NFIP requirements to examine code-related mitigation strategies for floods, winds, and earthquakes.

⁴⁰[GAO-10-113](#).

⁴¹[GAO-20-127](#).

effects on force readiness, military bases, and training ranges.⁴²

However, according to the Fourth National Climate Assessment, while a significant portion of climate risk can be addressed by mainstreaming, the practice may reduce the visibility of climate resilience relative to dedicated, stand-alone approaches and may prove insufficient to address the full range of climate risks.⁴³

In addition, as we reported in March 2019, the Disaster Recovery Reform Act of 2018 (DRRA) was enacted in October 2018 and could improve state and local resilience to disasters. DRRA, among other things, allows the President to set aside, with respect to each major disaster, a percentage of the estimated aggregate amount of certain grants to use for predisaster hazard mitigation and makes federal assistance available to state and local governments for building code administration and enforcement.⁴⁴ However, it is too early to tell what impact implementing the act will have on state and local resilience.

The federal government has made some limited investments in resilience, and DRRA could enable additional improvements at the state and local levels. However, we reported in October 2019 that the federal government does not have a strategic approach for investing in climate resilience projects—that is, an intentional, crosscutting approach in which the federal government identifies and prioritizes projects for the purpose

⁴²R. Lempert, J. Arnold, R. Pulwarty, K. Gordon, K. Greig, C. Hawkins Hoffman, D. Sands, and C. Werrell, “2018: Reducing Risks Through Adaptation Actions,” in *Impacts, Risks, and Adaptation in the United States: Fourth National Climate Assessment, Volume II* (Washington, D.C.: U.S. Global Change Research Program, 2018). We also reported in May 2014 that officials from the Office of the Secretary of Defense and the military departments stated that their goal is to address potential climate change impacts and vulnerabilities through existing infrastructure planning processes so that the effects of climate change are considered in the same way other impacts and vulnerabilities—such as force protection—are currently considered. GAO, *Climate Change Adaptation: DOD Can Improve Infrastructure Planning and Processes to Better Account for Potential Impacts*, [GAO-14-446](#) (Washington, D.C.: May 30, 2014).

⁴³Lempert, R., J. Arnold, R. Pulwarty, K. Gordon, K. Greig, C. Hawkins Hoffman, D. Sands, and C. Werrell, 2018: Reducing Risks Through Adaptation Actions. In *Impacts, Risks, and Adaptation in the United States: Fourth National Climate Assessment, Volume II* (Washington, D.C.: U.S. Global Change Research Program, 2018).

⁴⁴FAA Reauthorization Act of 2018, Pub. L. No. 115-254, div. D, §§ 1206(a)(3), 1234(a)(2)(C), 1234(a)(5), 132 Stat. 3186, 3440, 3462 (2018). The FAA Reauthorization Act of 2018, which included DRRA, became law on October 5, 2018.

of enhancing climate resilience.⁴⁵ Federal agencies may take actions to invest in projects with potential climate resilience benefits related to their own mission areas using funds from federal programs designed for other purposes. In addition, the National Climate Assessment provides high-level information on what is known about observed and projected climate risks in the United States. However, no federal entity looks holistically at the federal government's investments to strategically prioritize projects to ensure that they address the nation's most significant climate risks and provide the highest net benefits relative to other potential projects.

Further, we reported in September 2017 that the federal government had not undertaken strategic government-wide planning to manage significant climate risks before they become fiscal exposures.⁴⁶ As an initial step in managing climate risks, most of the experts we interviewed for the September 2017 report told us that federal decision makers should prioritize risk management efforts on significant climate risks that create the greatest fiscal exposure.⁴⁷

Moreover, several stakeholders told us that the federal government's emphasis has been on funding postdisaster efforts instead of funding resilience projects before a disaster occurs. This is consistent with findings from our July 2015 report that most federal funding for hazard mitigation is only available after a disaster.⁴⁸ In addition, according to FEMA officials, some of the agency's hazard mitigation programs are designed to empower state and local governments to determine their mitigation funding priorities, and these state and local priorities may or may not align with the federal interest.

Finally, although we did not identify a government-wide strategic approach specifically for investing in climate resilience projects, the

⁴⁵GAO-20-127. To make this assessment, we reviewed documents describing federal climate change activities, past GAO work, and related reports and confirmed our finding with stakeholders we interviewed, including those from USGCRP and the Mitigation Framework Leadership Group.

⁴⁶[GAO-17-720](#).

⁴⁷[GAO-17-720](#).

⁴⁸For example, we reported that for fiscal years 2011 through 2014, FEMA obligated more than \$3.2 billion for the Hazard Mitigation Grant Program for postdisaster hazard mitigation while obligating approximately \$222 million for the Pre-Disaster Mitigation Grant Program. [GAO-15-515](#). In providing comments on a draft version of this report, FEMA officials told us that postdisaster hazard mitigation assistance could also reduce the impacts of future events.

National Mitigation Investment Strategy—a national effort under way to plan for predisaster resilience investments—represents a potential cross-agency vehicle for climate resilience planning. However, the strategy does not specifically address climate change or identify and prioritize specific climate resilience projects.

The Federal Government Could Reduce Its Fiscal Exposure by Focusing and Coordinating Federal Efforts

As we reported in March 2019, the federal government could reduce its fiscal exposure to climate change by focusing and coordinating federal efforts.⁴⁹ However, the federal government is currently not well organized to address the fiscal exposure presented by climate change, partly because of the inherently complicated and crosscutting nature of the issue. We have made a total of 62 recommendations related to limiting the federal government’s fiscal exposure to climate change over the years, 12 of which have been made since February 2017.⁵⁰ As of December 2018, 25 of these recommendations remained open. In describing what needs to be done to reduce federal fiscal exposure to climate change, our March 2019 High-Risk Report discusses many of the open recommendations.⁵¹ Implementing these recommendations could help reduce federal fiscal exposure. Several of them, including those highlighted below, identify key government-wide efforts needed to help plan for and manage climate risks and direct federal efforts toward common goals, such as improving resilience.

- **Develop a national strategic plan:** In May 2011, we recommended that appropriate entities within the Executive Office of the President

⁴⁹[GAO-19-157SP](#).

⁵⁰In June 2019, we reported that we had made a total of 62 recommendations related to limiting the federal government’s fiscal exposure to climate change over the years, 12 of which had been made since February 2017. GAO, *Climate Change: Opportunities to Reduce Federal Fiscal Exposure*, GAO-19-625T (Washington, D.C.: June 11, 2019).

⁵¹We update our High-Risk List every 2 years. To determine which federal government programs and functions should be designated high risk, we consider qualitative factors, such as whether the risk could result in significantly impaired service or significantly reduced economy, efficiency, or effectiveness; the exposure to loss in monetary or other quantitative terms; and corrective measures planned or under way. We have issued the following five criteria for an area to be removed from the list: leadership commitment, capacity, action plan, monitoring, and demonstrated progress. In the March 2019 report, the federal government regressed in progress toward meeting the monitoring criterion for the *Limiting the Federal Government’s Fiscal Exposure by Better Managing Climate Change Risks* high-risk area. Criteria for removing this area from the High-Risk List include demonstrating leadership commitment that is sustained and enhanced to address all aspects of the federal fiscal exposure to climate change cohesively. See [GAO-19-157SP](#).

(EOP), including the Office of Management and Budget, work with agencies and interagency coordinating bodies to establish federal strategic climate change priorities that reflect the full range of climate-related federal activities, including roles and responsibilities of key federal entities.⁵²

- **Use economic information to identify and respond to significant climate risks:** In September 2017, we recommended that the appropriate entities within EOP use information on the potential economic effects of climate change to help identify significant climate risks facing the federal government and craft appropriate federal responses.⁵³ Such federal responses could include establishing a strategy to identify, prioritize, and guide federal investments to enhance resilience against future disasters.
- **Provide decision makers with the best-available climate information:** In November 2015, we reported that federal efforts to provide information about climate change impacts did not fully meet the climate information needs of federal, state, local, and private sector decision makers, which hindered their efforts to plan for climate change risks.⁵⁴ We reported that these decision makers would benefit from a national climate information system that would develop and update authoritative climate observations and projections specifically for use in decision-making. As a result, we recommended that EOP (1) designate a federal entity to develop and periodically update a set of authoritative climate observations and projections for use in federal decision-making, which other decision makers could also access, and (2) designate a federal entity to create a national climate information system with defined roles for federal agencies and nonfederal entities with existing statutory authority.⁵⁵
- **Consider climate information in design standards:** In November 2016, we reported that design standards, building codes, and voluntary certifications established by standards-developing organizations play a role in ensuring the resilience of infrastructure to

⁵²EOP neither agreed nor disagreed with our recommendation and, as of March 2019, had not implemented it. [GAO-11-317](#).

⁵³EOP neither agreed nor disagreed with this recommendation and, as of March 2019, had not implemented it. [GAO-17-720](#).

⁵⁴[GAO-16-37](#).

⁵⁵EOP neither agreed nor disagreed with these recommendations and, as of March 2019, had not implemented them.

the effects of natural disasters.⁵⁶ However, we reported that these organizations faced challenges in using forward-looking climate information that could help enhance the resilience of infrastructure. As a result, we recommended in the November 2016 report that the Department of Commerce (Commerce), acting through the National Institute of Standards and Technology—which is responsible for coordinating federal participation in standards organizations—convene federal agencies for an ongoing government-wide effort to provide the best-available forward-looking climate information to standards-developing organizations for their consideration in the development of design standards, building codes, and voluntary certifications.⁵⁷

In addition, in October 2019, we recommended that Congress consider establishing a federal organizational arrangement to periodically identify and prioritize climate resilience projects for federal investment.⁵⁸ We also identified six key steps the federal government could use to prioritize climate resilience investments and opportunities to increase the climate resilience impacts of federal funding options that Congress could use in designing the arrangement.⁵⁹

In October 2019 we also issued the *Disaster Resilience Framework* to serve as a guide for analysis of federal action to facilitate and promote resilience to natural disasters.⁶⁰ The framework identifies three key principles that can help federal efforts to promote disaster resilience, including building resilience to climate change. First, authoritative and understandable information can help decision makers identify current and future risks and the impact of risk-reduction strategies. Second, integrated

⁵⁶GAO, *Climate Change: Improved Federal Coordination Could Facilitate Use of Forward-Looking Climate Information in Design Standards, Building Codes, and Certifications*, [GAO-17-3](#) (Washington, D.C.: Nov. 30, 2016).

⁵⁷Commerce neither agreed nor disagreed with this recommendation and, as of May 2018, had not implemented it.

⁵⁸[GAO-20-127](#).

⁵⁹The six key steps we identified were (1) define the effort's strategic goals and provide an entity with authority to lead the effort; (2) identify and assess high-risk regions, sectors, and climate risks; (3) identify potential project ideas by seeking proposals or via an expert panel; (4) prioritize projects using key criteria; (5) implement high-priority projects when funds are available; and (6) monitor projects and climate risks to inform future decisions.

⁶⁰GAO, *Disaster Resilience Framework: Principles for Analyzing Federal Efforts to Facilitate and Promote Resilience to Natural Disasters*, [GAO-20-100SP](#) (Washington, D.C.: October 2019).

analysis and strategic planning can help decision makers take coherent and coordinated resilience actions. Third, financial and nonfinancial incentives can help make long-term, forward-looking risk-reduction investments more viable and attractive among competing priorities.

In conclusion, the effects of climate change have already posed and will continue to pose risks that can create fiscal exposure across the federal government, and this exposure will continue to increase. The federal government does not generally account for such fiscal exposure to programs in the budget process, and it has not undertaken strategic efforts to manage significant climate risks that could reduce the need for far more costly steps in the decades to come. To reduce its fiscal exposure, the federal government needs a cohesive strategic approach with strong leadership and the authority to manage risks across the entire range of related federal activities. The federal government could make further progress toward reducing fiscal exposure by implementing the recommendations we have made.

Chairman Rouda, Ranking Member Comer, and Members of the Subcommittee, this completes my prepared statement. I would be pleased to respond to any questions that you may have at this time.

GAO Contact and Staff Acknowledgments

If you or your staff have any questions about this testimony, please contact J. Alfredo Gómez, Director, Natural Resources and Environment, at (202) 512-3841 or gomezj@gao.gov. Contact points for our Offices of Congressional Relations and Public Affairs may be found on the last page of this statement. GAO staff who made key contributions to this testimony are Joseph Dean Thompson (Assistant Director), Micah McMillan (Analyst in Charge), Holly Halifax, Caitlin Jackson, Richard Johnson, Joe Maher, Oliver Richard, and Kiki Theodoropoulos.

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