



Testimony  
Before the Committee on the Budget,  
House of Representatives

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# CLIMATE CHANGE

## Opportunities to Reduce Federal Fiscal Exposure

Statement of J. Alfredo Gómez, Director, Natural  
Resources and Environment

# GAO Highlights

Highlights of [GAO-19-625T](#), a testimony before the Committee on the Budget, House of Representatives

## 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-19-625T](#). For more information, contact J. Alfredo Gómez at (202) 512-3841 or [gomezj@gao.gov](mailto:gomezj@gao.gov).

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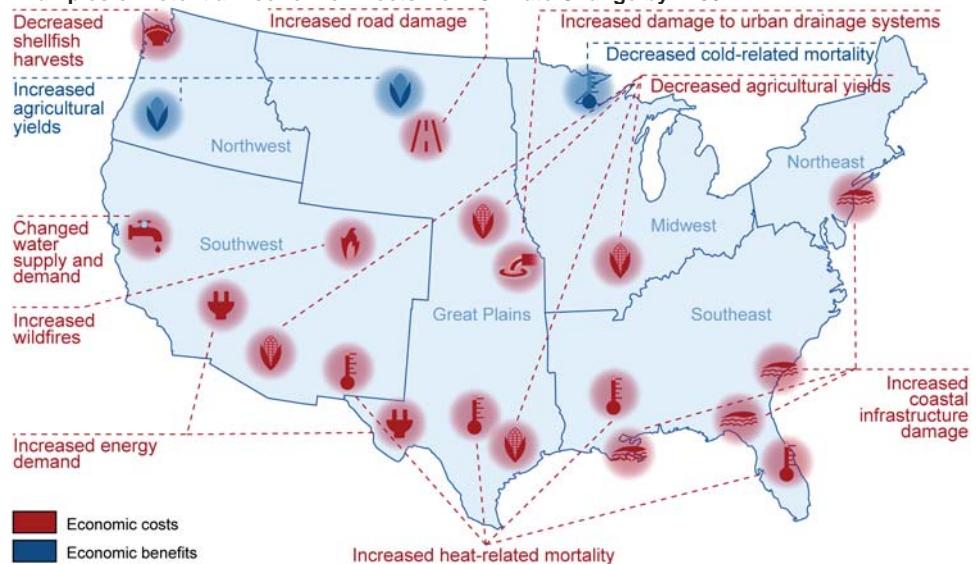
## CLIMATE CHANGE

### 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 recent 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-19-625T

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 does not adequately plan for disaster resilience. 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 Federal Emergency

This testimony—based on reports GAO issued from October 2009 to March 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 potential impacts of climate change on the federal budget, (3) the extent to which the federal government has invested in resilience, and (4) how the federal government could reduce fiscal exposure to the effects of climate change.

GAO has 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.

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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.

The federal budget, however, does not generally account for disaster assistance provided by Congress or the long-term impacts of climate change on existing federal infrastructure and programs. GAO has reported that more complete information about fiscal exposure could help policymakers better understand the trade-offs when making spending decisions.

Further, 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.

The federal government has invested in individual agency efforts that could help build resilience within existing programs or projects. For example, the National Climate Assessment reported that the U.S. military integrates climate risks into its analysis, plans, and programs. In addition, as GAO reported in March 2019, the Disaster Recovery Reform Act of 2018 could improve resilience by allowing the President to set aside a portion of certain grants for pre-disaster mitigation. However, the federal government has not undertaken strategic government-wide planning to manage climate risks.

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 design standards and building codes to enhance infrastructure resilience.

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Chairman Yarmuth, Ranking Member Womack, and Members of the Committee:

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.<sup>1</sup> 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).<sup>2</sup> Further, on June 6, 2019, a supplemental appropriation of approximately \$19.1 billion was signed into law for recent disasters.

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.<sup>3</sup> These changes include the rise in vulnerability to drought, lengthening wildfire seasons, and the 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

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<sup>1</sup>Our 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.: Feb. 14, 2013).

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

<sup>3</sup>D.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, DC: 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.

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increase as extreme weather events become more frequent and intense with climate change.<sup>4</sup>

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 potential impacts of climate change on the federal budget, (3) the extent to which the federal government has invested in resilience to climate change impacts,<sup>5</sup> 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 March 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.

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<sup>4</sup>Jerry M. Melillo, Terese (T.C.) Richmond, and Gary W. Yohe, eds., *Climate Change Impacts in the United States: The Third National Climate Assessment*, U.S. Global Change Research Program (Washington, D.C.: May 2014).

<sup>5</sup>The National Academies of Sciences, Engineering, and Medicine (National Academies) 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; 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. These include climate change adaptation and pre-disaster hazard mitigation. Adaptation is defined as adjustments to natural or human systems in response to actual or expected climate change. Pre-disaster 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 the term “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).



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## 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.<sup>6</sup> We 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.<sup>7</sup> 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.<sup>8</sup> 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 Great Plains (see figure 1).<sup>9</sup> This is

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<sup>6</sup>GAO, *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).

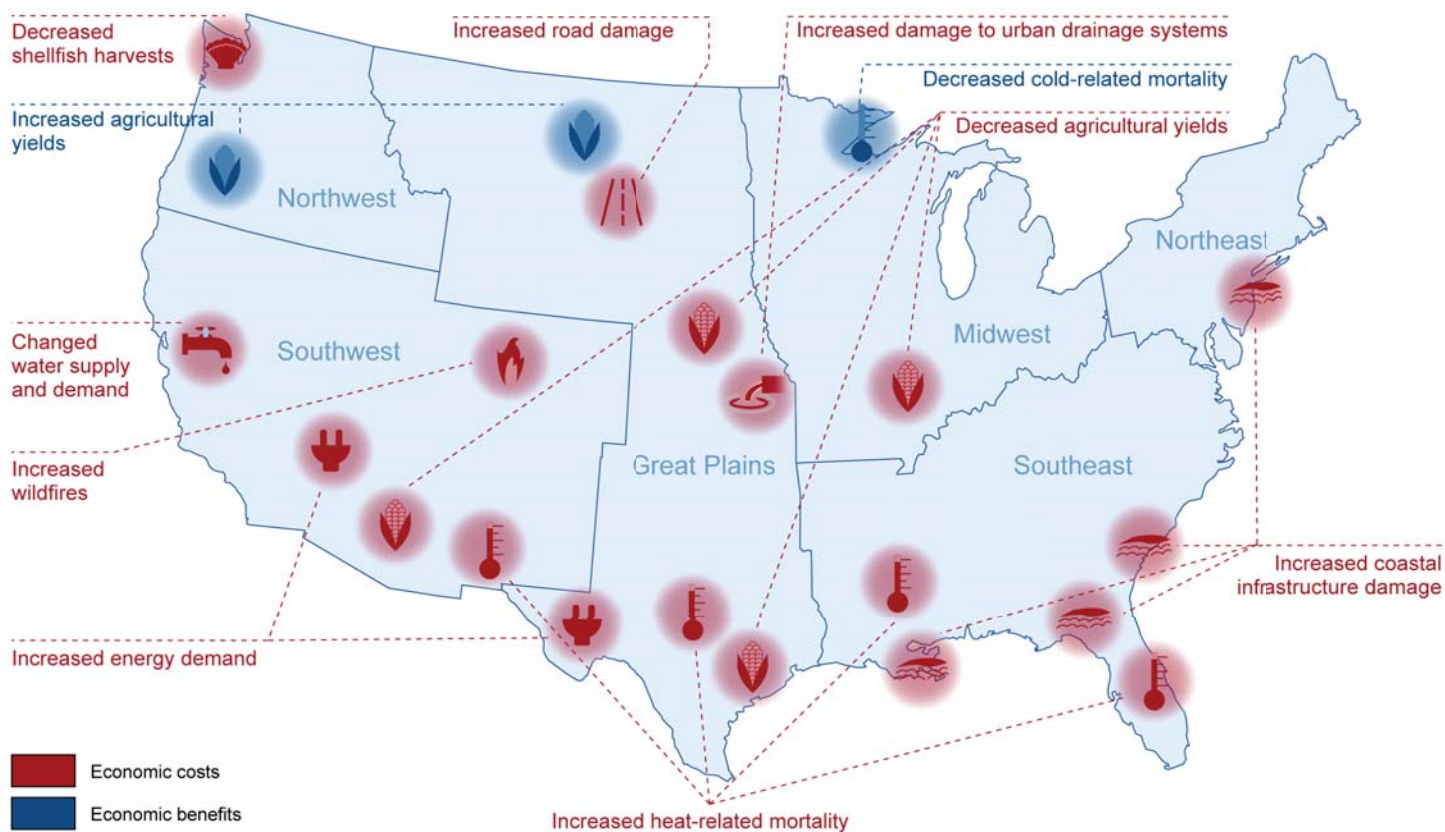
<sup>7</sup>These national-scale studies were the Environmental Protection Agency's *Climate Change Impacts and Risk Analysis*—a summary study of an ongoing EPA project—and the Rhodium Group's *American Climate Prospectus*. See Environmental Protection Agency, Office of Atmospheric Programs, *Climate 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).

<sup>8</sup>Rhodium Group, *American Climate Prospectus*.

<sup>9</sup>Rhodium Group, *American Climate Prospectus*.

consistent with the findings of the Fourth National Climate Assessment.<sup>10</sup> 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-19-625T

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

<sup>10</sup>D.R. Reidmiller et al., *Fourth National Climate Assessment, Volume II*.

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experts we interviewed.<sup>11</sup> 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.<sup>12</sup> Such a first step is consistent with leading practices for climate risk management and federal standards for internal control.<sup>13</sup> For example, leading practices from the National Academies call for climate change risk management efforts that focus on where immediate attention is needed.<sup>14</sup> 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.<sup>15</sup>

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<sup>11</sup>In 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](#).

<sup>12</sup>[GAO-17-720](#).

<sup>13</sup>National 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* and GAO, *Standards for Internal Control in the Federal Government*, [GAO-14-704G](#) (Washington, D.C.: September 2014).

<sup>14</sup>National 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).

<sup>15</sup>[GAO-17-720](#).



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## The Federal Government Faces Fiscal Exposure from Climate Change Risks, but Does Not Have Certain Information Needed to Help Make Budget Decisions

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.<sup>16</sup> 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:<sup>17</sup>

- **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 is at least \$450 billion.<sup>18</sup> 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.<sup>19</sup> Subsequently, the fall of 2018 brought additional catastrophic

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<sup>16</sup>GAO-17-720.

<sup>17</sup>We 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.

<sup>18</sup>This 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, 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. H.R. 2157, 116th Cong. (2019) (enacted).

<sup>19</sup>GAO, *2017 Hurricanes and Wildfires: Initial Observations on the Federal Response and Key Recovery Challenges*, GAO-18-472 (Washington, D.C.: Sept. 4, 2018).

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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 observed and projected by USGCRP.<sup>20</sup> In July 2015, we reported that the federal government does not adequately plan for disaster resilience and that most federal funding for hazard mitigation is available after a disaster.<sup>21</sup> In addition, our prior work found that the Federal Emergency Management Agency’s (FEMA) 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.<sup>22</sup> 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 the insured property and crops to climate change.<sup>23</sup> These 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

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<sup>20</sup>Jerry M. Melillo, et. al., *Climate Change Impacts in the United States: The Third National Climate Assessment*.

<sup>21</sup>For 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 post-disaster 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).

<sup>22</sup>GAO, *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).

<sup>23</sup>The NFIP 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.

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the federal crop insurance program totaled \$51.3 billion.<sup>24</sup> 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. The NFIP, for example, was about \$21 billion in debt to the Treasury as of April 2019.<sup>25</sup> 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.<sup>26</sup>

- **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.<sup>27</sup> Appropriations for federal wildland fire management activities have increased

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<sup>24</sup>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.

<sup>25</sup>U. S. Department of The Treasury, Bureau of the Fiscal Service. *Monthly Treasury Statement. Table 6. Schedule C* (Washington, D.C.: April 2019).

<sup>26</sup>Congressional Budget Office, *CBO's May 2019 Baseline for Farm Programs* (Washington, D.C.: May 2, 2019).

<sup>27</sup>GAO, *Climate Change: Various Adaptation Efforts Are Under Way at Key Natural Resource Management Agencies*, [GAO-13-253](#) (Washington, D.C.: May 31, 2013).

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considerably since the 1990s, as we and the Congressional Research Service have reported.<sup>28</sup>

Although the federal government faces fiscal exposure from climate change across the nation, it does not have certain information needed by policymakers to help understand the budgetary impacts of such exposure.<sup>29</sup> We have previously reported that the federal budget generally does not account for disaster assistance provided by Congress—which can reach tens of billions of dollars for some disasters—or the long-term impacts of climate change on existing federal infrastructure and programs.<sup>30</sup> For Example, as we reported in April 2018, the Office of Management and Budget’s (OMB) climate change funding reports we reviewed did not include funding information on federal programs with significant fiscal exposures to climate change identified by OMB and others—such as domestic disaster assistance, flood insurance, and crop insurance.<sup>31</sup> A more complete understanding of climate change fiscal exposures can help policymakers anticipate changes in future spending and enhance control and oversight over federal resources, as we reported in October 2013.<sup>32</sup> For budget decisions for federal programs with fiscal exposure to climate change, we found in the April 2018 report that information that could help provide a more complete understanding would include: (1) costs to repair, replace, and improve the weather-related resilience of federally-funded property and resources; (2) costs for

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<sup>28</sup>GAO, *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 115<sup>th</sup> Congress*, R44966 (Washington, D.C.: November 8, 2017).

<sup>29</sup>In our past work, we identified broad principles for an effective budget process, including that it should (1) provide information about the long-term effects of decisions; (2) provide information necessary to make important trade-offs between spending with long-term benefits and spending with short-term benefits, and (3) provide for accountability and be transparent, among other principles. Further, in October 2013, we reported that incorporating more complete information on fiscal exposures could help meet these principles for an effective budget process. See GAO, *Budget Process: Enforcing Fiscal Choices*, [GAO-11-626T](#) (Washington, D.C.: May 4, 2011) and GAO, *Fiscal Exposures: Improving Cost Recognition in the Federal Budget*, [GAO-14-28](#) (Washington, D.C.: Oct. 29, 2013).

<sup>30</sup>[GAO-14-505T](#).

<sup>31</sup>GAO, *Climate Change: Analysis of Reported Federal Funding*, [GAO-18-223](#) (Washington, D.C.: Apr. 30, 2018).

<sup>32</sup>[GAO-14-28](#).

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federal flood and crop insurance programs; and (3) costs for disaster assistance programs, among other identified areas of fiscal exposure to climate change.<sup>33</sup> To help policymakers better understand the trade-offs when making spending decisions, we recommended in the April 2018 report that OMB provide information on fiscal exposures related to climate change in conjunction with future reports on climate change funding.<sup>34</sup>

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## Federal Investments in Resilience to Climate Change Impacts Have Been Limited

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 elevating homes and strengthened building codes in Texas and Florida prevented greater damages during the 2017 hurricane season.<sup>35</sup> 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.<sup>36</sup> Finally, a 2018 interim report by the National Institute of Building Sciences examined a sample of federal grants for hazard mitigation. The report estimated approximate benefits to society (i.e., homeowners, communities, etc.) in excess of costs for several types of resilience projects through the protection of lives and property, and prevention of other losses.<sup>37</sup> For example, while

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<sup>33</sup>GAO-18-223.

<sup>34</sup>OMB disagreed with this recommendation and has not implemented it, but we continue to believe that the recommendation is valid. GAO-18-223.

<sup>35</sup>Specifically, FEMA officials said Hurricane Harvey demonstrated how prior hazard mitigation projects prevented greater damages (e.g., elevated homes and equipment sustained less damages). FEMA officials said Florida strengthened its building codes for resilience as a result of Hurricanes Andrew in 1992, and Matthew in 2016. GAO-18-472.

<sup>36</sup>GAO, *Highlights of a Forum: Preparing for Climate-Related Risks: Lessons from the Private Sector*, GAO-16-126SP (Washington, D.C.: Nov. 19, 2015).

<sup>37</sup>This report examined a narrow sample of 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- 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).



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precise benefits are uncertain, the report estimated that for every grant dollar the federal government spent on resilience projects, over time, society could accrue benefits amounting to the following:

- About \$3 on average from projects addressing fire at the wildland urban interface, with most benefits (69 percent) coming from the protection of property (i.e., avoiding property losses).
- About \$5 on average from projects to address hurricane and tornado force winds, with most benefits (89 percent) coming from the protection of lives. This includes avoiding deaths, nonfatal injuries, and causes of post-traumatic stress.
- About \$7 on average from projects that buy out buildings prone to riverine flooding, with most benefits (65 percent) coming from the protection of property.

The interim report also estimated 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 developed by the International Code Council—with most benefits (46 percent) coming from the protection of property.<sup>38</sup>

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.<sup>39</sup> 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 effects on force readiness, military

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<sup>38</sup>The International Code Council is a member-focused association with over 64,000 members dedicated to developing model codes and standards used 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 National Flood Insurance Program requirements.

<sup>39</sup>GAO, *Climate Change Adaptation: Strategic Federal Planning Could Help Government Officials Make More Informed Decisions*, [GAO-10-113](#) (Washington, D.C.: Oct. 7, 2009).

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bases, and training ranges.<sup>40</sup> 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.<sup>41</sup>

In addition, as we reported in March 2019, the Disaster Recovery Reform Act of 2018 (DRRA) was enacted in October 2018, which 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 pre-disaster hazard mitigation and makes federal assistance available to state and local governments for building code administration and enforcement.<sup>42</sup> However, it is too early to tell what impact the implementation of 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 level. However, 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.<sup>43</sup> We also reported in July 2015 that the federal government had no comprehensive strategic approach for identifying, prioritizing, and

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<sup>40</sup>Lempert, 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). 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).

<sup>41</sup>Lempert, 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).

<sup>42</sup>FAA 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 the DRRA, became law on October 5th, 2018.

<sup>43</sup>[GAO-17-720](#).

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implementing investments for disaster resilience.<sup>44</sup> 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.<sup>45</sup> However, as we reported in our March 2019 High-Risk List, the federal government had not made measurable progress since 2017 to reduce fiscal exposure in several key areas that we have identified.<sup>46</sup> The High-Risk List identified *Limiting the Federal Government's Fiscal Exposure by Better Managing Climate Change Risks* as an area needing significant attention because the federal government has regressed in progress toward one of our criterion for removal from the list.<sup>47</sup>

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<sup>44</sup>In our 2015 report, we recommended that the Mitigation Framework Leadership group—an interagency body chaired by FEMA—create a National Mitigation Investment Strategy to help federal, state, and local officials plan for and prioritize disaster resilience. In response, the Mitigation Framework Leadership Group developed a draft, high-level strategy. FEMA officials expect to publish the final version of the strategy by July 2019. However, the draft strategy does not explicitly address future climate change risks. [GAO-15-515](#).

<sup>45</sup>[GAO-17-720](#).

<sup>46</sup>[GAO-19-157SP](#).

<sup>47</sup>We 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.

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## 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.<sup>48</sup> 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. 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.<sup>49</sup> 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 (EOP), including OMB, 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.<sup>50</sup>
- **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.<sup>51</sup> Such federal responses could include establishing a strategy to identify, prioritize, and guide federal investments to enhance resilience against future disasters.

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<sup>48</sup>[GAO-19-157SP](#).

<sup>49</sup>[GAO-19-157SP](#).

<sup>50</sup>EOP neither agreed nor disagreed with our recommendation and as of March 2019, had not implemented it. GAO, *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).

<sup>51</sup>EOP neither agreed nor disagreed with this recommendation and as of March 2019, had not implemented it. [GAO-17-720](#).

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- **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.<sup>52</sup> 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.<sup>53</sup>
  - **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 the effects of natural disasters. However, we reported that these organizations faced challenges to 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, 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.<sup>54</sup>

In conclusion, the effects of climate change have already and will continue to pose risks that can create fiscal exposure across the federal government and this exposure will continue to increase. The federal

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<sup>52</sup>GAO-16-37.

<sup>53</sup>EOP neither agreed nor disagreed with these recommendations and as of March 2019, had not implemented them.

<sup>54</sup>Commerce neither agreed nor disagreed with this recommendation and as of May 2018, had not implemented it. GAO, *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).



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government does not generally account for such fiscal exposure to programs in the budget process nor has it 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.

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

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## GAO Contact and Staff Acknowledgments

If you or your staff have any questions about this testimony, please contact me at (202) 512-3841 or [gomezj@gao.gov](mailto: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 J. Alfredo Gómez (Director), Joseph Dean Thompson (Assistant Director), Anne Hobson (Analyst in Charge), Celia Mendive, Kiki Theodoropoulos, Reed Van Beveren, and Michelle R. Wong.

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