



*United States Senate Committee on*  
**Homeland Security &  
Governmental Affairs**

U.S. Senator Gary Peters | Ranking Member

— THE COST OF —  
**INACTION**

**Failure to Address Financial Costs of  
Climate Change Will Hurt Taxpayers**

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**THE COST OF INACTION:**

***FAILURE TO ADDRESS FINANCIAL COSTS OF CLIMATE CHANGE WILL HURT  
TAXPAYERS***

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## EXECUTIVE SUMMARY

The costs to taxpayers of climate change and its impacts on infrastructure and communities throughout the United States are potentially devastating. Extreme weather events are increasing in frequency and severity. Failing to address the risks, both human and financial, created by our changing climate threatens to do great harm to our economy and our country in the future. In the last fourteen years, catastrophic hurricanes, flooding, wildfires, and related extreme events have cost the federal government and American taxpayers half a trillion dollars in disaster assistance alone. The most recent National Climate Assessment warns that the increasing intensity of these events will continue to cause significant strain for the country's aging infrastructure. However, unlike prior administrations, this Administration has offered little or no guidance on addressing these and other threats associated with climate change. Worse, the Trump Administration has taken steps to eliminate research and funding necessary to alleviate the costs of climate change.

The U.S. Government Accountability Office (GAO) is the independent, nonpartisan agency responsible for examining how taxpayer dollars are spent. It is charged with providing Congress, the Executive Branch, and the public with fact-based independent information to improve government functioning and save taxpayer dollars. Every two years, GAO issues its High Risk List and accompanying report, identifying areas of government operations "vulnerable to fraud, waste, abuse, and mismanagement or in need of reform to address economy, efficiency, or effectiveness challenges." On March 6, 2019, the U.S. Senate Committee on Homeland Security and Governmental Affairs held a hearing on GAO's 2019 High Risk report. One risk highlighted during the hearing is the financial risk to the American taxpayer as a result of the federal government's limited action in addressing the dangers posed by climate change. Costs associated with this risk are projected to rise in coming years. The *National Institute of Building Sciences*, however, reports that for every \$1 spent on adaptation strategies, like utilizing federal mitigation grants or mitigating infrastructure, savings ranging from \$4 to \$11 can be realized as a result.

To better understand the impact to taxpayers associated with climate change and extreme weather, Senator Gary Peters, Ranking Member of the Senate Homeland Security and Governmental Affairs Committee, directed minority staff to examine the financial costs of disaster assistance, failures to date to mitigate costs associated with climate change, and the potential savings that could be achieved through enhancing the federal government's efforts to promote strategies to adapt to changing climate conditions. This minority staff report utilizes existing research on the current and future financial cost of extreme weather events and estimated adaptation spending levels to detail potential savings. The report also examines the Trump Administration's inaction on climate adaptation and mitigation efforts, its proposed budget cuts to federal programs and offices focusing on adaptation research and development, and the need for more reporting on climate change-related costs.

## Findings of Fact and Recommendations

### Findings of Fact

1. GAO reports that “[t]he rising number of natural disasters and increasing reliance on federal assistance is a key source of federal fiscal exposure.” GAO has determined that “[s]ince 2005, federal funding for disaster assistance is approaching half a trillion dollars ... most recently for catastrophic hurricanes, flooding, wildfires, and other losses in 2017 and 2018.”
2. In the *Fourth National Climate Assessment*, the U.S. Global Change Research Program warns that the increasing intensity and frequency of these weather events will cause significant stress for much of our nation’s aging and deteriorating infrastructure.
3. The Midwest is vulnerable to several challenges posed by climate-induced extreme precipitation and flooding. The U.S. Global Change Research Program estimates that Michigan and nearby states, are “projected to incur the second highest [amount of] damages to roads and bridges...” in the country, reaching \$6 billion annually by 2090.
4. According to the U.S. Global Change Research Program, “adaptation could reduce over 75% of the cumulative impacts to coastal properties, roads, and the rail system in the U.S., resulting in hundreds of billions of dollars in cumulative benefits this century.”
5. The National Institute of Building Sciences (NIBS) finds for every \$1 spent on adaptation strategies, like utilizing federal mitigation grants or mitigating infrastructure, savings ranging from \$4 to \$11 can be realized as a result.
6. According to GAO, the Trump Administration has failed to produce critical information — such as federal domestic disaster assistance, flood insurance, and crop insurance — necessary for assessing the federal government and American taxpayer fiscal exposure to the costs of climate change and extreme weather events.
7. From fiscal year 2017 to fiscal year 2020, the Trump Administration has proposed divesting more than \$9.4 billion from climate adaptation federal government entities and research and grant programs, potentially costing American taxpayers billions in adaptation savings.

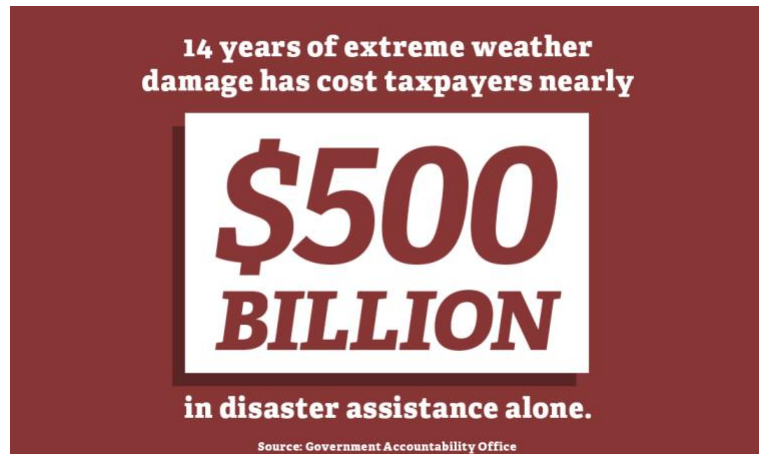
## Recommendations

To better safeguard taxpayer dollars, address the risks created by the Administration's refusal to invest in mitigation and adaptation strategies, and to help better plan for future economic, health, and related risks due to the costs associated with climate change, this report makes the following recommendations:

1. The Administration should commit to publishing accurate accounting information on climate change funding. To ensure an accurate accounting, the Administration should adhere to the recommendations of GAO to implement the appropriate federal accounting protocols to measure the costs associated with the impacts of climate change.
2. The Administration should amend its FY2020 budget proposal to restore previous funding levels for the programs and offices identified in this report and similarly focused programs and offices and assess whether increased budgetary commitments are needed beyond previously requested levels. Any assessment on whether to increase or decrease funding levels for these programs and offices should be accompanied by an explanatory report, delivered to Congress, including specific reasons for increases or decreases, and explaining how such requests affect our country's ability to adapt to climate change.
3. Congress should improve existing adaptation and grant funding programs and, where needed, expand federal adaptation grant funding to improve our country's infrastructure and reduce the financial recovery costs of extreme weather events for taxpayers.
4. Congress should act to ensure that the Administration begins complying with the requirements of the Global Change Research Act of 1990 and publicly reports on funding requests and allocations for research required under the Act.

## I. THE RISING FINANCIAL COSTS OF EXTREME WEATHER

On March 6, 2019, the U.S. Government Accountability Office (GAO) issued its latest High Risk List and accompanying report.<sup>1</sup> The list is a catalogue of programs and operations of the federal government that represent a “high risk” as a result of their exposure to potential fraud, waste, abuse, mismanagement, or need for transformation. In the past 13 years, more than \$350 billion in financial benefits have been secured through reforms recommended by the list.<sup>2</sup> One high risk area added in 2013 is the fiscal risk for American taxpayers created by the federal government’s limited action in addressing the dangers posed by climate change. The 2019 High Risk report states that, “[s]ince 2005, federal funding for disaster assistance is approaching half a trillion dollars . . . most recently for catastrophic hurricanes, flooding, wildfires, and other losses in 2017 and 2018.” In characterizing the growing costs, GAO warned, “[t]he rising number of natural disasters and increasing reliance on federal assistance is a key source of federal fiscal exposure.” These costs are projected to rise as the frequency and intensity of extreme weather events increase.<sup>3</sup>



The *National Institute of Building Sciences* finds, however, that for every \$1 spent on adaptation strategies, like utilizing federal mitigation grants or mitigating infrastructure, savings ranging from \$4 to \$11 can be realized as a result.<sup>4</sup> Adaptation strategies are strategies that focus on “adapting to life in a changing climate, [and are comprised of] adjusting to actual or expected future climate.” Mitigation strategies are strategies that focus on “reducing climate change, [and are comprised of] reducing the flow of heat-trapping greenhouse gases into the atmosphere.”<sup>5</sup>

<sup>1</sup> U.S. Government Accountability Office: *GAO’s 2019 High Risk List: Two Areas Removed but Major Progress Eludes Many Programs and Some Ratings Declined* (Mar. 6, 2019); U.S. Government Accountability Office, *High-Risk Series: Substantial Efforts Needed to Achieve Greater Progress on High-Risk Areas* (GAO-19-157SP) (Mar. 2019).

<sup>2</sup> U.S. Government Accountability Office, High Risk List ([www.gao.gov/highrisk/overview](http://www.gao.gov/highrisk/overview)) (accessed Mar. 6, 2019).

<sup>3</sup> See U.S. Government Accountability Office, *High-Risk Series: Substantial Efforts Needed to Achieve Greater Progress on High-Risk Areas* (GAO-19-157SP) (Mar. 2019), referring to U.S. Global Change Research Program, *2018: Impacts, Risks, and Adaptation in the United States: Fourth National Climate Assessment, Volume II* ([nca2018.globalchange.gov/](http://nca2018.globalchange.gov/)) (Nov. 2018).

<sup>4</sup> National Institute of Building Sciences, *Natural Hazard Mitigation Saves: 2018 Interim Report* (Dec. 2018).

<sup>5</sup> National Aeronautics and Space Administration, *Global Climate Change, Vital Signs of the Planet, Solutions, Responding to Climate Change* ([climate.nasa.gov/solutions/adaptation-mitigation/](http://climate.nasa.gov/solutions/adaptation-mitigation/)) (accessed Mar. 31, 2019). In the context of climate change, the term “adaptation” is used to describe the process of making improvements to adjust to a changing climate. The term “mitigation” in the climate change context is as described above; however, outside of

According to the U.S. Global Change Research Program (USGCRP), adaptation strategies, coupled with efforts to lower human-climate impacts, “[have] the potential to limit climate change risks and reduce society’s vulnerability to climate change impacts.”<sup>6</sup> USGCRP finds that adaptation strategies “could reduce over 75% of the cumulative impacts to coastal properties, roads, and the rail system in the U.S., resulting in hundreds of billions of dollars in cumulative benefits this century.”<sup>7</sup>

Despite these findings, the Trump Administration has deprioritized adaptation strategies.<sup>8</sup> According to GAO, and as detailed below, the Trump Administration has failed to provide critical information for climate change related expenditures, such as federal domestic disaster assistance, flood insurance, and crop insurance. Information about these expenditures is necessary to assess federal government and taxpayer fiscal exposure to the costs of climate change and extreme weather events.<sup>9</sup> Nevertheless, opportunity still exists to adapt and enhance infrastructure resiliency in the United States in the face of extreme weather events. According to USGCRP’s 2018 *Fourth National Climate Assessment* and the National Institute of Building Sciences’ 2018 *Natural Hazard Mitigation Saves* interim report, increased adaptation and mitigation efforts would lower recovery costs following an extreme weather disaster and save billions in taxpayer dollars.<sup>10</sup>

## A. Climate Change and Extreme Weather Events

Extreme weather events are the main way in which individuals experience the effects of climate change. These events represent statistically significant deviations from previous weather events and typically result in high levels of property damage. The strength and increased frequency of these events is a result of human-induced climate change.<sup>11</sup> With “prolonged

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the climate change context, the term “mitigation” possesses a meaning similar to that of the term “adaptation” in the context of climate change.

<sup>6</sup> U.S. Global Change Research Program, *The Multi-Model Framework for Quantitative Sectoral Impacts Analysis: A Technical Report for the Fourth National Climate Assessment* (EPA 430-R-17-001) (May 2017).

<sup>7</sup> U.S. Global Change Research Program, *The Multi-Model Framework for Quantitative Sectoral Impacts Analysis: A Technical Report for the Fourth National Climate Assessment* (EPA 430-R-17-001) (May 2017).

<sup>8</sup> See The White House, *Budget of the U.S. Government A New Foundation for American Greatness Fiscal Year 2018* (ISBN 978-0-16-093922-8) (May 23, 2017); The White House, *Analytical Perspectives Budget of the U.S. Government Fiscal Year 2018* (ISBN 978-0-16-093934-1) (May 2017); The White House, *Fiscal Year 2019 Efficient, Effective, Accountable: An American Budget* (ISBN 978-0-16-094480-2) (Feb. 2018); The White House, *Fiscal Year 2019 Efficient, Effective, Accountable: An American Budget Analytical Perspectives* (ISBN 978-0-16-094482-6) (Feb. 2018); The White House, *A Budget for a Better America Fiscal Year 2020* (ISBN 978-0-16-095071-1) (Mar. 11, 2019); The White House, *A Budget for a Better America Analytical Perspectives Fiscal Year 2020* (ISBN 978-0-16-095073-5) (Mar. 2019).

<sup>9</sup> U.S. Government Accountability Office, *Climate Change: Analysis of Reported Federal Funding* (GAO-18-223) (Apr. 2018).

<sup>10</sup> See U.S. Global Change Research Program, *2018: Impacts, Risks, and Adaptation in the United States: Fourth National Climate Assessment, Volume II* (nca2018.globalchange.gov/) (Nov. 2018); and National Institute of Building Sciences, *Natural Hazard Mitigation Saves: 2018 Interim Report* (Dec. 2018).

<sup>11</sup> See U.S. Global Change Research Program, *Climate Change Impacts in the United States: The Third National Climate Assessment*, (nca2014.globalchange.gov/highlights/report-findings/extreme-weather) (May 2014); and

periods of excessively high temperatures, heavy downpours, and in some regions, severe floods and droughts,” most Americans have been affected by the Earth’s changing climate.<sup>12</sup> Typically, heat waves are associated with the altering weather circumstances of climate change. These heat waves include periods of unusually high temperatures spanning multiple days or weeks. However, the increased frequency of heat waves is not the only marker of climate change. Extreme weather events include droughts, heavy downpours, floods, hurricanes, and an increased shift northward of winter storms. Other trends in severe storms, “including the intensity and frequency of tornadoes, hail, and damaging thunderstorm winds,” are also being studied.<sup>13</sup>

In addition to the significant damage and expense to infrastructure rebuilding efforts following extreme weather events, these events are also a threat to human health and safety.<sup>14</sup> Extreme weather events disproportionately impact minority and low-income communities, and, “may have long-term consequences to the health and collective well-being of those affected.”<sup>15</sup> The health impacts of extreme weather events can include death, injury, illness, or exacerbation of existing conditions, and damaging effects on mental health.<sup>16</sup> The concern for the public health effects of climate change and extreme weather events has prompted some state and local entities to prepare climate and health adaptation programs. In Michigan, for example, through the support of the U.S. Centers for Disease Control and Prevention, the Michigan Department of Health and Human Services operates the Michigan Climate and Health Adaptation Program. The program aims to build a climate-resilient public health system for Michigan.<sup>17</sup>

Such efforts serve an important purpose, as the increase in frequency and intensity of extreme weather events increases health risks across the United States, including the Midwest. Health risks to coastal populations are also increased by the impact of extreme weather. Heavy precipitation and flooding could disproportionately impact “persons with disabilities or other access and functional needs, certain populations of color, older adults, pregnant women and children, low-income populations, and some occupational groups.” These extreme weather events can damage critical infrastructure, “including power, water, transportation, and

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National Oceanic and Atmospheric Administration, National Centers for Environmental Information, U.S. Billion-Dollar Weather and Climate Disasters ([www.ncdc.noaa.gov/billions/](http://www.ncdc.noaa.gov/billions/)) (accessed Apr. 18, 2019).

<sup>12</sup> U.S. Global Change Research Program, *Climate Change Impacts in the United States: The Third National Climate Assessment*, ([nca2014.globalchange.gov/highlights/report-findings/extreme-weather](http://nca2014.globalchange.gov/highlights/report-findings/extreme-weather)) (May 2014).

<sup>13</sup> U.S. Global Change Research Program, *Climate Change Impacts in the United States: The Third National Climate Assessment*, ([nca2014.globalchange.gov/](http://nca2014.globalchange.gov/)) (May 2014).

<sup>14</sup> U.S. Global Change Research Program, *Climate Change Impacts in the United States: The Third National Climate Assessment*, ([nca2014.globalchange.gov/](http://nca2014.globalchange.gov/)) (May 2014).

<sup>15</sup> National Institute of Building Sciences, *Natural Hazard Mitigation Saves: 2018 Interim Report* (Dec. 2018).

<sup>16</sup> U.S. Global Change Research Program, *The Impacts of Climate Change on Human Health in the United States: A Scientific Assessment* (Apr. 2016).

<sup>17</sup> Michigan Department of Health and Human Services, Michigan Climate and Health Adaptation Program, Program Details ([www.michigan.gov/mdhhs/0,5885,7-339-71548\\_54783\\_54784\\_55975-365486--,00.html](http://www.michigan.gov/mdhhs/0,5885,7-339-71548_54783_54784_55975-365486--,00.html)) (accessed Apr. 2, 2019).



communication systems that are essential to maintaining access to health care and emergency response services and safeguarding human health.”<sup>18</sup>

## **B. Financial Costs**

The National Oceanic and Atmospheric Administration (NOAA) tracks severe weather and climate events that take place in the United States through its National Centers for Environmental Information (NCEI) component offices. Often called upon to summarize “global and U.S. temperature and precipitation trends, extremes, and comparisons in their historical perspective,” NCEI focuses on climate events with large economic and societal impacts. NCEI catalogued climate events between 1980 and 2018 where overall damage costs resulting from an event have reached or exceeded at least \$1 billion per event. While GAO’s 2019 High Risk report estimated federal expenditures for disaster assistance at nearly half a trillion dollars, the total cost of damage estimated by NCEI is much higher.<sup>19</sup> According to NCEI, of the 246 weather events exceeding at least \$1 billion between 1980 and 2018 “[t]he total cost of these 246 events exceeds \$1.6 trillion.”<sup>20</sup>

The impacts and costs of extreme weather events are staggering, and GAO has warned that the rising costs are “a key source of federal fiscal exposure.”<sup>21</sup> These costs are projected to rise further as the frequency and intensity of extreme weather events increase.<sup>22</sup> In November 2016 the Office of Management and Budget (OMB) and the Council of Economic Advisors released an assessment that found “recurring costs that the federal government incurred as a result of climate change could increase by \$12 billion to \$35 billion per year by mid-century and by \$34 billion to \$112 billion per year by late-century.”<sup>23</sup>

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<sup>18</sup> U.S. Global Change Research Program, *The Impacts of Climate Change on Human Health in the United States: A Scientific Assessment* (Apr. 2016).

<sup>19</sup> See U.S. Government Accountability Office, *High-Risk Series: Substantial Efforts Needed to Achieve Greater Progress on High-Risk Areas* (GAO-19-157SP) (Mar. 2019) solely measuring federal disaster aid expenditure, in contrast to National Oceanic and Atmospheric Administration, National Centers for Environmental Information, U.S. Billion-Dollar Weather and Climate Disasters ([www.ncdc.noaa.gov/billions/](http://www.ncdc.noaa.gov/billions/)) (accessed Apr. 18, 2019), measuring “the estimated total costs of these events -- that is, the costs in terms of dollars that would not have been incurred had the event not taken place. Insured and uninsured losses are included in damage estimates. Sources include the National Weather Service, the Federal Emergency Management Agency, U.S. Department of Agriculture, National Interagency Fire Center, U.S. Army Corps, individual state emergency management agencies, state and regional climate centers, media reports, and insurance industry estimates.” *Id.*

<sup>20</sup> National Oceanic and Atmospheric Administration, National Centers for Environmental Information, U.S. Billion-Dollar Weather and Climate Disasters ([www.ncdc.noaa.gov/billions/](http://www.ncdc.noaa.gov/billions/)) (accessed Apr. 18, 2019).

<sup>21</sup> U.S. Government Accountability Office, *High-Risk Series: Substantial Efforts Needed to Achieve Greater Progress on High-Risk Areas* (GAO-19-157SP) (Mar. 2019).

<sup>22</sup> See U.S. Government Accountability Office, *High-Risk Series: Substantial Efforts Needed to Achieve Greater Progress on High-Risk Areas* (GAO-19-157SP) (Mar. 2019), referring to U.S. Global Change Research Program, *2018: Impacts, Risks, and Adaptation in the United States: Fourth National Climate Assessment, Volume II* ([nca2018.globalchange.gov/](http://nca2018.globalchange.gov/)) (Nov. 2018).

<sup>23</sup> See U.S. Government Accountability Office, *Climate Change: Information on Potential Economic Effects Could Help Guide Federal Efforts to Reduce Fiscal Exposure* (GAO-17-720) (Sept. 2017) summarizing the findings of Executive Office of the President, *Climate Change: The Fiscal Risks Facing the Federal Government*

Tropical cyclones have created the highest level of damage expenses since 1980. In total, “[t]ropical cyclones have caused the most damage (\$927.5 billion, [Consumer Price Index (CPI)]-adjusted) and also have the highest average event cost (\$22.1 billion per event, CPI-adjusted).” NCEI also identifies droughts (\$247.0 billion, CPI-adjusted), severe storms (\$232.6 billion, CPI-adjusted), and flooding (\$124.7 billion, CPI-adjusted) as causing considerable damage. There have been over one hundred severe storms, forty-two tropical cyclones, and thirty floods exceeding the \$1 billion mark per storm since 1980.<sup>24</sup>

In the report, *Expected Costs of Damage from Hurricane Winds and Storm-Related Flooding*, the Congressional Budget Office (CBO) forecasts that federal expenditure on recovery efforts following extreme weather events will increase. Along with limiting the greenhouse gas emissions and shifting certain costs to state and local governments and private entities to reduce development in vulnerable areas, the report also recommends investing in structural changes to reduce the country’s financial exposure following extreme weather events. CBO estimates that without altering climate conditions or policies, “the expected annual cost to the federal government—and thus to taxpayers—of damage from hurricane winds and storm-related flooding is \$17 billion for the major categories of spending that CBO analyzed.” Without federal commitments to address the threat to infrastructure posed by climate change, the report finds, expected costs of hurricane winds and storm-related flooding are expected to reach \$54 billion annually, or .3% of gross domestic product. The annual cost consists of roughly “\$34 billion in expected annual economic losses to the residential sector, \$9 billion to commercial businesses, and \$12 billion to the public sector.”<sup>25</sup>

Extreme weather events were particularly volatile in 2018. While the annual average of \$1 billion weather and climate disaster events between 1980 and 2018 is 6.3 events per year (CPI-adjusted), in 2018 alone fourteen storms and climate related disasters with losses exceeding \$1 billion per storm occurred across the United States. In addition to eight severe storms and two tropical cyclones, there was one drought, one wildfire, and two winter storm events, each causing more than \$1 billion in damages in 2018. In addition, the average for \$1 billion events from 2014 to 2018 was 12.6 events per year, outpacing the 1980-2018 annual average.<sup>26</sup>

In the *Fourth National Climate Assessment (NCA)*, the USGCRP warned policymakers that the increasing intensity and frequency of these weather events will cause significant stress for much of our nation’s aging and deteriorating infrastructure. The assessment concludes that

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([obamawhitehouse.archives.gov/sites/default/files/omb/reports/omb\\_climate\\_change\\_fiscal\\_risk\\_report.pdf](https://obamawhitehouse.archives.gov/sites/default/files/omb/reports/omb_climate_change_fiscal_risk_report.pdf)) (Nov. 2016).

<sup>24</sup> National Oceanic and Atmospheric Administration, National Centers for Environmental Information, Billion-Dollar Weather and Climate Disasters: Summary Stats ([www.ncdc.noaa.gov/billions/summary-stats](http://www.ncdc.noaa.gov/billions/summary-stats)) (accessed Apr. 18, 2019).

<sup>25</sup> Congressional Budget Office, *Expected Costs of Damage from Hurricane Winds and Storm-Related Flooding* (55019) (April 2019).

<sup>26</sup> National Oceanic and Atmospheric Administration, National Centers for Environmental Information, Billion-Dollar Weather and Climate Disasters: Summary Stats ([www.ncdc.noaa.gov/billions/summary-stats](http://www.ncdc.noaa.gov/billions/summary-stats)) (accessed Apr. 18, 2019).

“[w]ithout adaptation, climate change will continue to degrade infrastructure performance over the rest of the century, with the potential for cascading impacts that threaten our economy, national security, essential services, and health and well-being.” Climate change and extreme weather events are expected to threaten our energy and transportation systems through fuel shortages and poorly adapted infrastructure. In addition, high-tide flooding also “threatens American’s trillion-dollar coastal property market and public infrastructure, with cascading impacts to the larger economy.” Further, the increased drought risk also poses significant concern. USGCRP predicts, “[i]ncreased drought risk will threaten oil and gas drilling and refining, as well as electricity generation from power plants that rely on surface water for cooling.” Without significant mitigation and adaptation efforts, USGCRP predicts that escalating temperatures, “sea level rise, and changes in extreme events are expected to increasingly disrupt and damage critical infrastructure and property, labor productivity, and the vitality of our communities.”<sup>27</sup>

### **C. Inequitable Costs**

The rising cost of extreme weather events disproportionately affects economically vulnerable populations. Extreme weather events, including floods, droughts, heat waves, and urban heat islands, are likely to worsen existing infrastructure deficiencies. These events will make communities in the Midwest and across the country increasingly vulnerable to climate change. According to USGCRP, Tribal nations, “are especially vulnerable because of their reliance on threatened natural resources for their cultural, subsistence, and economic needs.” Rural communities also face increased risk as a result of climate-induced weather events. In addition to lower estimated crop yields, “rural residents are also highly vulnerable to climate change effects due to their economic dependence on their natural resource base, which is subject to multiple climate stressors.” Rural communities also face challenges following flood events. In addition to limited transportation redundancies, damaged roadways can impose both economic and logistical costs on these communities.<sup>28</sup>

Economically vulnerable urban communities also face increasing pressure from extreme weather events. In particular, “[t]he urban setting tends to amplify climate change impacts, such as flooding, on the performance of the transportation network.” Sewer systems not designed to handle increasing rainfall totals, coastal concerns exacerbated by extreme weather, and frequent localized flooding can all disproportionately threaten urban environments. Even with transportation redundancies, extreme weather disruptions can severely impact communities. The USGCRP reports that interruptions to transportation systems during extreme weather events can disproportionately affect “low-income people, older adults, people with limited English proficiency, and other vulnerable populations.” With the increasing costs associated with climate-induced weather events, communities across the Midwest and the United States face challenges and opportunities related to adapting infrastructure to prepare for current and future

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<sup>27</sup> U.S. Global Change Research Program, *2018: Impacts, Risks, and Adaptation in the United States: Fourth National Climate Assessment, Volume II* (nca2018.globalchange.gov/) (Nov. 2018).

<sup>28</sup> U.S. Global Change Research Program, *2018: Impacts, Risks, and Adaptation in the United States: Fourth National Climate Assessment, Volume II* (nca2018.globalchange.gov/) (Nov. 2018).

climate change. Successfully adapting could lower the cost of recovering from extreme weather events.<sup>29</sup>

#### D. National Security Impacts

Failure to adequately pursue adaptation and mitigation efforts could also lead to costly consequences for national security preparedness. In 2018, during Hurricane Michael, multiple F-22 Raptors at Tyndall Air Force Base in Florida were damaged “because they could not be evacuated prior to the storm.”<sup>30</sup> The storm damage to the base cost the Air Force approximately \$3 billion. One month



earlier, the Marine Corps incurred an estimated \$3.6 billion in damages and needed repairs to Camp Lejeune from the impacts of Hurricane Florence.<sup>31</sup> The risks posed by these and other storms were not unknown. In 2014, the Department of Defense (DOD) found that climate change presented significant concerns for DOD property and infrastructure.<sup>32</sup> At the March 6, 2019 hearing on the 2019 High Risk List, Ranking Member Peters questioned GAO Comptroller General Eugene L. Dodaro about the risk of not adapting to these threats, and Comptroller General Dodaro reiterated the need for DOD to develop a thorough plan to ensure their facilities are adapted to lessen the potential financial cost of climate change.<sup>33</sup>

In 2017, a press report detailed the troubling condition of Naval Station Norfolk in Norfolk, Virginia. According to a press account, the base, home of the Atlantic Fleet, floods not just in heavy rains or during hurricanes. “It floods when the sun is shining, too, if the tide is high or the winds are right. It floods all the time.” The flooding is in part due to the eroding

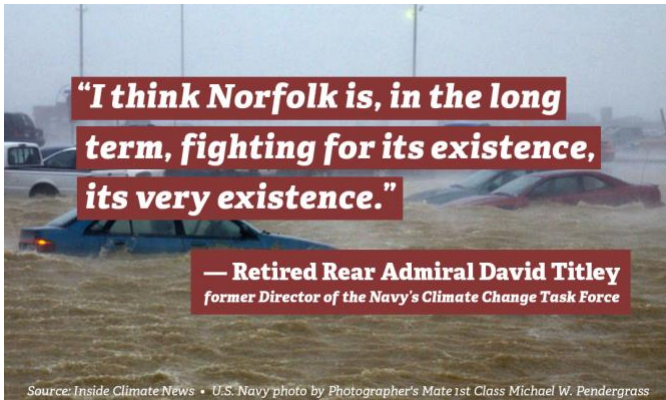
<sup>29</sup> U.S. Global Change Research Program, *2018: Impacts, Risks, and Adaptation in the United States: Fourth National Climate Assessment, Volume II* (nca2018.globalchange.gov/) (Nov. 2018).

<sup>30</sup> Senate Committee on Homeland Security and Governmental Affairs, *Hearing on High Risk List 2019: Recommendations to Reduce Risk of Waste, Fraud, and Mismanagement in Federal Programs*, 116<sup>th</sup> Cong. (Mar. 6, 2019) (S. Hrg. 116).

<sup>31</sup> U.S. Government Accountability Office, *High-Risk Series: Substantial Efforts Needed to Achieve Greater Progress on High-Risk Areas* (GAO-19-157SP) (Mar. 2019).

<sup>32</sup> Senate Committee on Homeland Security and Governmental Affairs, *Hearing on High Risk List 2019: Recommendations to Reduce Risk of Waste, Fraud, and Mismanagement in Federal Programs*, 116<sup>th</sup> Cong. (Mar. 6, 2019) (S. Hrg. 116).

<sup>33</sup> Senate Committee on Homeland Security and Governmental Affairs, *Hearing on High Risk List 2019: Recommendations to Reduce Risk of Waste, Fraud, and Mismanagement in Federal Programs*, 116<sup>th</sup> Cong. (Mar. 6, 2019) (S. Hrg. 116).



coastline, and retired Rear Admiral David Titley, who led the Navy’s Climate Change Task Force, stated, “I think Norfolk is, in the long term, fighting for its existence, its very existence.” Despite the concern, the report noted, “the Pentagon has barely begun the hard work of adaptation,” and though the Norfolk base is uniquely susceptible to flooding concerns, “rising seas are [also] threatening hundreds of other U.S. military bases around the world.”<sup>34</sup>

In 2019, Offutt Air Force Base in Nebraska experienced severe flooding. The U.S. military’s Strategic Command was heavily impacted when the Missouri River flooded the base in March. Struggling to perform “round-the-clock sandbagging by airmen and others ... [those located at the base] had to scramble to save sensitive equipment, munitions and dozens of aircraft.” The flooding lasted days and almost 80 buildings on the base were filled with water, including some buildings inundated with as much as 7 feet of water. Col. David Norton, responsible for maintaining premises on the base, told the *Associated Press*: “In the end, obviously, the waters were just too much. It took over everything we put up ... [t]he speed at which it came in was shocking.”<sup>35</sup>



This damage, as retired Rear Admiral Titley has noted, serves as a reminder that extreme weather events brought on by climate change are not confined to the coasts, and that national security installations could be impacted as well. The *Associated Press* highlighted the fact that, “[u]nder the Trump administration, unlike in previous administrations, the Pentagon has offered little public comment on climate change as a security threat.” In fact, according to the *Associated Press*, the National Defense Strategy, prepared by the Pentagon as a roadmap for strategic planning, “does not even mention climate change.”<sup>36</sup>

<sup>34</sup> *Rising Seas Are Flooding Norfolk Naval Base, and There’s No Plan to Fix It*, Inside Climate News with The Weather Channel (Oct. 2017) ([insideclimatenews.org/news/10252017/military-norfolk-naval-base-flooding-climate-change-sea-level-global-warming-virginia](https://insideclimatenews.org/news/10252017/military-norfolk-naval-base-flooding-climate-change-sea-level-global-warming-virginia)).

<sup>35</sup> *Floods suggest national security threat from climate change*, Associated Press (Mar. 22, 2019) ([www.apnews.com/6d929a38194c4d10b4fc360dfc676b1f](https://www.apnews.com/6d929a38194c4d10b4fc360dfc676b1f)).

<sup>36</sup> *Floods suggest national security threat from climate change*, Associated Press (Mar. 22, 2019) ([www.apnews.com/6d929a38194c4d10b4fc360dfc676b1f](https://www.apnews.com/6d929a38194c4d10b4fc360dfc676b1f)).

In Michigan, planning is underway by the Michigan Army National Guard (MIARNG), which was selected by the Assistant Secretary of the Army for Installations, Energy, and Environment and the National Guard Bureau, to pilot a U.S. Council on Environmental Quality effort to enhance the strategic resilience of military installations. MIARNG “was selected based on its ongoing sustainability/resiliency efforts as well as its participation in the Michigan Climate Coalition, a statewide partnership of universities, businesses, non-profit organizations and government agencies interested in climate science [and] adaptation.”<sup>37</sup>

In furtherance of these efforts, MIARNG prepared a report entitled *Adaptation Planning for Climate Resilience: A Michigan Army National Guard Pilot Project*. The report provides an assessment of training and base centers in Michigan, including the Fort Custer Training Center, Camp Grayling Joint Maneuver Training Center, and Selfridge Air National Guard Base. MIARNG’s report “details an action plan developed for each installation aimed at responding to and preventing the adverse impacts of climate change on the installation as well as in the greater community.” As the report states, protecting installations and surrounding Michigan communities against the impacts of climate change is important for the state’s agriculture, infrastructure, and human health. Each installation represents over \$895 million in payroll, operations, maintenance, and minor construction in annual regional economic impact alone, according to the report.<sup>38</sup>

## **E. Impacts in Michigan**

The Midwest is vulnerable to several challenges posed by climate change-induced extreme precipitation and flooding. Management systems for storm water, transportation networks, and other critical infrastructure “are already experiencing impacts from changing precipitation patterns and elevated flood risks.” Compared with present day totals, annual precipitation levels since the early half of the last century (1901 – 1960) have increased from five to fifteen percent. The growing precipitation levels have meant more extreme precipitation weather events that “overwhelm storm water sewage systems, disrupt transportation networks, and cause damage to infrastructure and property.” The runoff from these extreme weather events “can exceed the capacity of storm water systems, resulting in property damage, including basement backups.”<sup>39</sup>

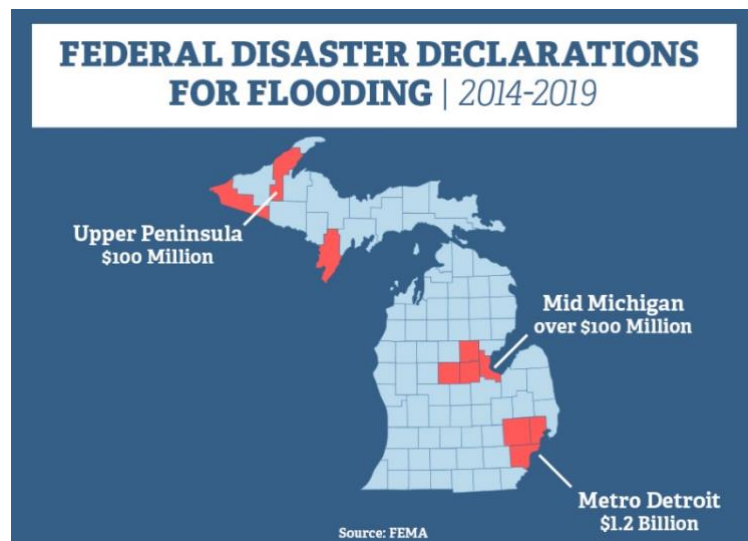
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<sup>37</sup> Michigan Army National Guard, *Adaptation Planning for Climate Resilience, A Michigan Army National Guard Pilot Project: A demonstration project to strengthen the communities neighboring three Michigan military installations* ([www.resilientmichigan.org/downloads/final\\_report\\_miarg\\_web.pdf](http://www.resilientmichigan.org/downloads/final_report_miarg_web.pdf)) (Jan. 2017).

<sup>38</sup> Michigan Army National Guard, *Adaptation Planning for Climate Resilience, A Michigan Army National Guard Pilot Project: A demonstration project to strengthen the communities neighboring three Michigan military installations* ([www.resilientmichigan.org/downloads/final\\_report\\_miarg\\_web.pdf](http://www.resilientmichigan.org/downloads/final_report_miarg_web.pdf)) (Jan. 2017).

<sup>39</sup> U.S. Global Change Research Program, *2018: Impacts, Risks, and Adaptation in the United States: Fourth National Climate Assessment, Volume II* ([nca2018.globalchange.gov/](http://nca2018.globalchange.gov/)) (Nov. 2018).

Michigan is already dealing with the impacts of extreme weather events. In 2014, for example, Detroit and surrounding communities experienced severe flooding following a “historic rainfall event . . . over Southeast Michigan.” Metro Detroit, Flint, and the Saginaw Valley areas were the hardest hit by the storm. Four to six inches of rain fell “over a 4 hour period” in Wayne, southern Oakland and Macomb Counties.<sup>40</sup> National Weather Service meteorologist Dan Thompson said the rainfall peaked at 4.57 inches at Detroit Metropolitan Airport, breaking the 1964 record of 2.06 inches.<sup>41</sup> In the days following the storm, “[c]ity officials in the hard-hit suburb of Warren estimated 18,047 structures were damaged, including one-third of its homes, with a total value of \$1.2 billion.”<sup>42</sup> Warren was also faced with the cost of repairing its police department, community center, and district court. An estimated 1,000 vehicles had to be towed due to the flooding. The storm also caused nearly 10 billion gallons of sewage to overflow into rivers and lakes. Prior to the storm, in February 2014, the Southeast Michigan Council of Governments reported that “at least 60 percent of the region’s sewer system was built before [the] 1970s and is worn out.”<sup>43</sup>



Across Michigan, severe weather has adversely impacted the state’s infrastructure. Flooding in Isabella County in 2017 caused an estimated \$90 million in damage to public and private property. In Midland County, estimates from the same flooding event reached \$13 million in needed repairs to roads and bridges damaged by the storms. As a result of the same flooding event, Gladwin and Bay Counties also experienced damage. Michigan residents and businesses were estimated to have incurred damages totaling \$39 million from the flooding, with public property damages close to \$27 million. Michigan’s agriculture sector was also

<sup>40</sup> U.S. Department of Commerce, National Oceanic and Atmospheric Administration, National Weather Service, August 11, 2014 Historic Rainfall ([www.weather.gov/dtx/081114\\_flooding](http://www.weather.gov/dtx/081114_flooding)) (accessed Mar. 31, 2019).

<sup>41</sup> *Michigan: Two Die in Record Flooding*, The New York Times (Aug. 12, 2014) ([www.nytimes.com/2014/08/13/us/michigan-two-die-in-record-flooding-.html](http://www.nytimes.com/2014/08/13/us/michigan-two-die-in-record-flooding-.html)).

<sup>42</sup> *Was the Detroit Flood a Billion-Dollar Disaster?*, The Weather Channel (Aug. 15, 2014) ([weather.com/safety/floods/news/detroit-warren-michigan-flood-billion-dollar-disaster-20140815](http://weather.com/safety/floods/news/detroit-warren-michigan-flood-billion-dollar-disaster-20140815)); also see *Residents sue over metro Detroit’s 2014 flood*, The Detroit News (May 13, 2016) ([www.detroitnews.com/story/news/local/oakland-county/2016/05/13/flood-lawsuit/84339938/](http://www.detroitnews.com/story/news/local/oakland-county/2016/05/13/flood-lawsuit/84339938/)) stating: “The Aug. 11 flash flooding caused an estimated \$1.1 billion in residential and commercial damage in Metro Detroit, according to lawmakers.”

<sup>43</sup> *Detroit Summer Rains Caused 10 Billion Gallons in Sewage Overflow*, The Weather Channel (Oct. 27, 2014) ([weather.com/news/news/detroit-summer-rains-caused-10-billion-gallons-sewage-overflow-20141027#9](http://weather.com/news/news/detroit-summer-rains-caused-10-billion-gallons-sewage-overflow-20141027#9)); also see *Id.*, stating: “The record-shattering rains in August were blamed on three deaths. At least five freeways were flooded, trapping motorists in their vehicles. More than 34,000 buildings were damaged.”

significantly impacted by the flooding. The U.S. Department of Agriculture estimated “a substantial loss of crops, with a financial impact on farmers and the agriculture economy of \$21 million.”<sup>44</sup>

In 2018, Lansing, Michigan experienced heavy rain and flooding not seen since 1975, creating potholes, damaging residential and commercial property, and “causing scores of road closures across the Lansing area ... [and the temporary closure of] the Potter Park Zoo.”<sup>45</sup> Another severe flooding event in 2018 created significant financial damages for Michigan counties located in the state’s Upper Peninsula. The total estimated cost of damage to public infrastructure in the Upper Peninsula was approximately \$100 million, not including costs to local residents and businesses.<sup>46</sup> The storm that led to the flooding dropped almost 7 inches of rain on the western Upper Peninsula and the areas experiencing the worst of the storm, included, Houghton, Hancock, Lake Linden and Dollar Bay. Rainfall and flooding created “up to 60 sinkholes and washed-out roads ... across those communities. Roads crumbled underneath the fast-moving water, exposing the utility pipes underneath.”<sup>47</sup>



On March 21, 2019, NOAA released the 2019 U.S. Spring Flood Outlook map. The map identified most of Michigan as more than 50% likely to experience minor flooding during the season (March to May 2019). On the Tuesday preceding the map’s release, Michigan Governor Gretchen Whitmer declared a state of emergency after yet another flood in western Michigan.<sup>48</sup>

The U.S. Global Change Research Program estimates that Michigan and nearby states are likely to experience among “the largest damages to infrastructure,” with the Midwest projected to incur “the second highest [amount of] damages to roads and bridges ...” in the country, reaching \$6 billion annually in damage costs by 2090. Estimates of damage to railroads predict

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<sup>44</sup> *Flood damage tops \$100 million across Mid-Michigan*, MLive (June 29, 2017) ([www.mlive.com/news/saginaw/2017/06/flood\\_damage\\_assessments\\_for\\_i.html](http://www.mlive.com/news/saginaw/2017/06/flood_damage_assessments_for_i.html)).

<sup>45</sup> Roads in Lansing closed due to flooding, potholes after days of rain, Lansing State Journal (Feb. 22, 2018) ([www.lansingstatejournal.com/story/news/2018/02/22/roads-lansing-closed-due-flooding-potholes-after-days-rain/362293002/](http://www.lansingstatejournal.com/story/news/2018/02/22/roads-lansing-closed-due-flooding-potholes-after-days-rain/362293002/)); also see, *After February flooding, some Lansing businesses still working to reopen*, Lansing State Journal (Apr. 17, 2018) ([www.lansingstatejournal.com/story/news/2018/04/17/february-flooding-lansing-businesses-still-working-reopen-green-dot-stables-bake-n-cakes/506411002/](http://www.lansingstatejournal.com/story/news/2018/04/17/february-flooding-lansing-businesses-still-working-reopen-green-dot-stables-bake-n-cakes/506411002/)).

<sup>46</sup> Houghton County Michigan Office of Emergency Measures: *Houghton County Disaster Recovery Update* (June 26, 2018) ([www.houghtoncounty.net/pictorials/70.pdf](http://www.houghtoncounty.net/pictorials/70.pdf)).

<sup>47</sup> *Pilot captures dramatic photos of U.P. flooding disaster*, MLive (June 2018) ([www.mlive.com/news/2018/06/pilot\\_captures\\_amazing\\_photos.html](http://www.mlive.com/news/2018/06/pilot_captures_amazing_photos.html)).

<sup>48</sup> *Spring prediction for Michigan could mean historic weather*, Detroit Free Press (Mar. 21, 2019) ([www.freep.com/story/news/local/michigan/2019/03/21/flooding-michigan/3233456002/](http://www.freep.com/story/news/local/michigan/2019/03/21/flooding-michigan/3233456002/)).



increases “from \$0.5 billion each year in 2050 to \$1.4 billion each year by 2090” according to one model.<sup>49</sup>

Additionally, increasing temperatures are expected to lift electricity consumption across the region, leading to estimated costs on the electric power system of between just under half a billion to \$1.2 billion per year by 2090. The region’s agricultural production is also likely to be negatively impacted. Under one model, “corn yields are projected to decline considerably ... from a 7.1% decrease in annual yield in 2050 to an 18% decrease in annual yield by the end of the century” and by an estimated 4.3 and 5.5 percent respectively under another model. The quality of water in the Midwest is also projected to decrease, and some damages to Midwest water quality are projected to be higher than all other U.S. regions.<sup>50</sup>

At the state and local level, Michigan is beginning to take action. In February 2019, Governor Gretchen Whitmer signed an Executive Directive entering Michigan into the U.S. Climate Alliance, “a bipartisan coalition of governors from 20 other states that have committed to reducing greenhouse gas emissions consistent with the goals of the Paris Climate Agreement.” The Michigan Department of Environmental Quality announced on February 21, 2019, a commitment to outline its strategy in addressing climate change.<sup>51</sup>

At the regional level, the Great Lakes Climate Adaptation Network includes local government officials who coordinate on climate adaptation challenges to the Great Lakes. It is an outgrowth of the Urban Sustainability Directors’ Network, and includes cooperative efforts with the Great Lakes Integrated Sciences and Assessments group, “a NOAA-supported program housed at the University of Michigan and Michigan State University.” These groups, working together with five Great Lakes cities (Ann Arbor, Dearborn, Evanston, Indianapolis, and Cleveland) have collaborated “to develop a universal vulnerability assessment template.” From the state to the local level, these examples illustrate efforts to integrate climate and equity-focused information into the planning process.<sup>52</sup>

## **II. ADAPTING INFRASTRUCTURE IN THE UNITED STATES TO SAVE TAXPAYER DOLLARS**

Along with significant and maintained reductions in global greenhouse gas emissions, adaptation provides a unique opportunity to save taxpayer dollars, improve our country’s infrastructure, and adjust to life in a changing climate. The U.S. Global Change Research Program (USGCRP) has concluded that taking these steps “has the potential to limit climate

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<sup>49</sup> U.S. Global Change Research Program, *The Multi-Model Framework for Quantitative Sectoral Impacts Analysis: A Technical Report for the Fourth National Climate Assessment* (EPA 430-R-17-001) (May 2017).

<sup>50</sup> U.S. Global Change Research Program, *The Multi-Model Framework for Quantitative Sectoral Impacts Analysis: A Technical Report for the Fourth National Climate Assessment* (EPA 430-R-17-001) (May 2017).

<sup>51</sup> Michigan Department of Environmental Quality: *MDEQ outlines Michigan's commitment to take action on climate change* (Feb. 21, 2019).

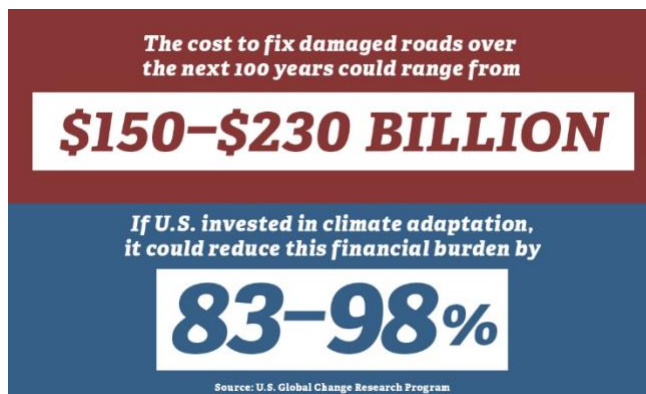
<sup>52</sup> U.S. Global Change Research Program, *2018: Impacts, Risks, and Adaptation in the United States: Fourth National Climate Assessment, Volume II* (nca2018.globalchange.gov/) (Nov. 2018).

change risks and reduce society’s vulnerability to climate change impacts.”<sup>53</sup> Adaptation can be either reactive or proactive. Reactive adaptation involves implementing structural changes following a climate-induced weather event. Proactive adaptation involves planning and implementing structural changes in anticipation of future climate-induced weather events.

### A. Adaptation Savings

Engineering and technological development play an integral role in adapting our infrastructural environment. Improvements in engineering and technology could mean developing new crop varieties, building coastal protection structures, and improving drainage. Altering crop planting dates and locations, constructing green infrastructure, creating financial adaptation incentives, updating zoning laws and building codes, updating disaster response plans, and expanding adaptive capacity through efforts to help environmentally and economically vulnerable populations are all potential cost-saving options. The USGCRP concludes that “well-timed adaptation could reduce over 75% of the cumulative impacts to coastal properties, roads, and the rail system in the U.S., resulting in hundreds of billions of dollars in cumulative benefits this century.”<sup>54</sup>

Data produced alongside the *Fourth National Climate Assessment* projects that changes in temperature and precipitation as a result of climate change are likely to result in significant financial commitments. If U.S. policy remains reactive rather than proactive, the data projects expenditures to rehabilitate damaged roads to be between \$150 and \$230 billion over the next century. If, however, U.S. policy is modified to focus on proactive adaptation, those costs are projected to decrease by between eighty-three and ninety-eight percent.<sup>55</sup>



An estimated 4,600 inland bridges will be vulnerable to impacts of climate change by 2050. While other models contain lower estimates, even under those models, estimates are still between 2,500 and 5,000 vulnerable bridges, from 2050 to 2090, respectively. Rising temperatures are projected to result in “significant damages to the U.S. rail system ... [with potential] damages through 2100 ... estimated at \$50 billion and \$40 billion under different models.” However, proactive measures are anticipated to be able to reduce costs to our rail system down to \$12 billion or \$4.5 billion through 2100, depending on the model. Urban

<sup>53</sup> U.S. Global Change Research Program, *The Multi-Model Framework for Quantitative Sectoral Impacts Analysis: A Technical Report for the Fourth National Climate Assessment* (EPA 430-R-17-001) (May 2017).

<sup>54</sup> U.S. Global Change Research Program, *The Multi-Model Framework for Quantitative Sectoral Impacts Analysis: A Technical Report for the Fourth National Climate Assessment* (EPA 430-R-17-001) (May 2017).

<sup>55</sup> U.S. Global Change Research Program, *The Multi-Model Framework for Quantitative Sectoral Impacts Analysis: A Technical Report for the Fourth National Climate Assessment* (EPA 430-R-17-001) (May 2017).

drainage is another consideration, especially given the need to address rising runoff levels associated with greater amounts of rainfall. Moreover, “cumulative discounted damages to coastal property in the contiguous U.S. are estimated at \$3.6 trillion through 2100” if adaptation efforts are not adopted.<sup>56</sup> Implementing adaptive measures will require the collective effort of households, industry, state and local authorities, and the federal government.

## **B. Benefit-Cost Ratio**

Adaptation was the topic of a 2018 report released by the National Institute of Building Sciences (NIBS).<sup>57</sup> NIBS was created in 1974 as a nonprofit, nongovernmental organization that joins together policymakers, industry, academics, labor and consumer interests, “to identify and resolve building process and facility performance problems.”<sup>58</sup> In December 2018, NIBS released *Natural Hazard Mitigation Saves: 2018 Interim Report*. The report finds that while environmental hazards pose significant risks for the United States, “there are measures governments, building owners, developers, tenants, and others can take to reduce the impacts of such events.” The report maintains that these measures would increase safety and limit property loss following weather disaster events. Recognizing the rising intensity and increased frequency of extreme weather events that increase the cost of disaster recovery efforts, the report finds that adaptation measures could promote job growth and additional forms of economic growth in addition to saving lives, money, and property.<sup>59</sup>

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<sup>56</sup> U.S. Global Change Research Program, *The Multi-Model Framework for Quantitative Sectoral Impacts Analysis: A Technical Report for the Fourth National Climate Assessment* (EPA 430-R-17-001) (May 2017); also see *Id.* explaining: “In short, discounting provides an equal basis to compare the value of economic impacts that occur in different time periods. The discount rate itself reflects the trade-off between consumption today and consumption tomorrow, meaning that with a positive discount rate, benefits that occur today are worth more than they would be tomorrow. There are many ways to select a discount rate and little consensus about which discount rate is most appropriate, particularly when assessing economic impacts that span generations. Therefore, this Technical Report uses 3%, a commonly employed rate in the climate impacts literature (e.g., see Goulder and Williams (2012)). This rate is also consistent with the consumption rate of interest recommended by federal guidance for benefit cost analysis, known as OMB Circular A-4, to capture “the rate at which ‘society’ discounts future consumption flows to their present value.” OMB based this rate on the real rate of return on long-term government debt averaged over a 30-year period prior to the issuance of Circular A-4 (2003). Goulder, Lawrence H. and Robertson C. Williams III, “The Choice of Discount Rate for Climate Change Policy Evaluation,” *Climate Change Economics*. Volume 4, Issue 3, November 2012, <http://dx.doi.org/10.1142/S2010007812500248>.”

<sup>57</sup> This report uses the term “adaptation.” See National Institute of Building Sciences, *Natural Hazard Mitigation Saves: 2018 Interim Report* (Dec. 2018) utilizing the term mitigation, rather than to “adaptation.”

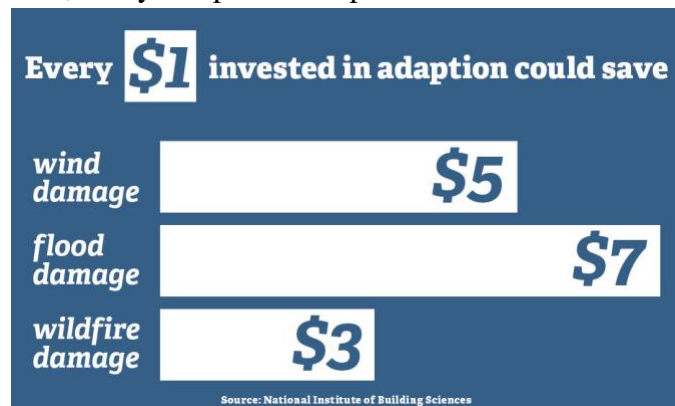
<sup>58</sup> National Institute of Building Sciences, About the Institute (<https://www.nibs.org/page/about>) (accessed Apr. 16, 2019).

<sup>59</sup> National Institute of Building Sciences, *Natural Hazard Mitigation Saves: 2018 Interim Report* (Dec. 2018).



In addition to highlighting the benefits of increased adaptation efforts, the report calculates a potential benefit-cost ratio (BCR) for multiple improvement measures. The report found that FEMA and HUD federal mitigation (or adaptation) grants provided over a twenty-three year period were associated with a national benefit of \$6 for every \$1 invested. The report identified additional potential savings by investing in infrastructural resiliency

improvements for specific natural hazard weather events. For riverine flooding, every \$1 spent on improvements could save \$7 dollars. For wind damage, every \$1 spent on improvements could save \$5. For wildland-urban interface fire, every \$1 spent on improvements could save \$3. Overall, spanning a twenty-three year period from 1993 to 2016, the report found that for every \$1 spent by the federal government on federal mitigation grants the federal government saved \$6 in post-extreme weather disaster recovery costs. The total cost of federal government grant funding during the twenty-three years examined by the report was \$27.4 billion, with an estimated savings of \$157.9 billion.<sup>60</sup>



However, despite collective research findings that estimate significant savings for taxpayers when the federal government invests in adaptation and mitigation for our country’s infrastructure, as detailed below, the current Administration has deprioritized adaptation strategies.<sup>61</sup> In addition, as detailed below, GAO has found that the Trump Administration failed to produce critical information—such as federal domestic disaster assistance, flood insurance, and crop insurance—necessary for assessing the federal government and the American taxpayer’s fiscal exposure to the costs of climate change and extreme weather events.<sup>62</sup>

<sup>60</sup> National Institute of Building Sciences, *Natural Hazard Mitigation Saves: 2018 Interim Report* (Dec. 2018).

<sup>61</sup> See The White House, *Budget of the U.S. Government A New Foundation for American Greatness Fiscal Year 2018* (ISBN 978-0-16-093922-8) (May 23, 2017); The White House, *Analytical Perspectives Budget of the U.S. Government Fiscal Year 2018* (ISBN 978-0-16-093934-1) (May 2017); The White House, *Fiscal Year 2019 Efficient, Effective, Accountable: An American Budget* (ISBN 978-0-16-094480-2) (Feb. 2018); The White House, *Fiscal Year 2019 Efficient, Effective, Accountable: An American Budget Analytical Perspectives* (ISBN 978-0-16-094482-6) (Feb. 2018); The White House, *A Budget for a Better America Fiscal Year 2020* (ISBN 978-0-16-095071-1) (Mar. 11, 2019); The White House, *A Budget for a Better America Analytical Perspectives Fiscal Year 2020* (ISBN 978-0-16-095073-5) (Mar. 2019).

<sup>62</sup> U.S. Government Accountability Office, *Climate Change: Analysis of Reported Federal Funding* (GAO-18-223) (Apr. 2018).

### III. TRUMP ADMINISTRATION INACTION ON ADDRESSING CLIMATE CHANGE COSTS

In its fiscal 2016 and 2017 budget requests, the Obama Administration included a section titled *Federal Budget Exposure to Climate Risk*. The section stated that “the imprint of climate change on the federal budget was increasingly apparent in the escalating costs for several federal programs or activities.”<sup>63</sup> The budget requests went further, noting that in the preceding 10 years, the federal government incurred more than \$350 billion in direct costs because of extreme weather and fire events alone, “including for domestic disaster response and relief (\$205 billion), flood insurance (\$23 billion), crop insurance (\$67 billion), wildland fire management (\$34 billion), and maintenance and repairs to Federal facilities and Federally managed lands, infrastructure, and waterways (\$28 billion).”<sup>64</sup>

The Obama Administration also prepared a 2016 assessment, titled *Climate Change: The Fiscal Risks Facing the Federal Government*. The Office of Management and Budget (OMB) and the Council of Economic Advisers contributed to the report. Focusing primarily on four program-specific areas – wildland fire suppression, crop insurance, healthcare related to air quality complications, and coastal disaster relief – the assessment found that while key limitations and uncertainties existed, climate change-related costs incurred by the federal government could average \$64 billion per year by the end of the century.<sup>65</sup>

Despite this precedent of research and analysis set by the Obama Administration, GAO found that the Trump Administration has not presented any information on the “funding of climate-related fiscal exposures discussed in the 2016 and 2017 Analytical Perspectives [budget requests].”<sup>66</sup> Unlike the Obama Administration, the Trump Administration has not produced an assessment of the fiscal risks climate change poses for the federal government and the American taxpayer. During the Obama Administration, OMB’s 2013 climate change funding report identified preparations begun by federal agencies to address climate change through actions outlined in their Climate Change Adaptation Plans. However, “federal funding associated with these actions was not included in [the Trump Administration’s] OMB 2017 report.” According to GAO, other information on climate change funding, such as federal domestic disaster

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<sup>63</sup> U.S. Government Accountability Office, *Climate Change: Analysis of Reported Federal Funding* (GAO-18-223) (Apr. 2018).

<sup>64</sup> The White House, *Analytical Perspectives: Budget of the U.S. Government, Fiscal Year 2017* (ISBN 978-0-16-093133-8) (Feb. 2016).

<sup>65</sup> See U.S. Government Accountability Office, *Climate Change: Analysis of Reported Federal Funding* (GAO-18-223) (Apr. 2018), summarizing, Executive Office of the President, *Climate Change: The Fiscal Risks Facing the Federal Government* (obamawhitehouse.archives.gov/sites/default/files/omb/reports/omb\_climate\_change\_fiscal\_risk\_report.pdf) (Nov. 2016); Executive Office of the President, *Climate Change: The Fiscal Risks Facing the Federal Government* (obamawhitehouse.archives.gov/sites/default/files/omb/reports/omb\_climate\_change\_fiscal\_risk\_report.pdf) (Nov. 2016).

<sup>66</sup> U.S. Government Accountability Office, *Climate Change: Analysis of Reported Federal Funding* (GAO-18-223) (Apr. 2018).

assistance, flood insurance, and crop insurance, has also disappeared from climate change funding reports since the beginning of the Trump Administration.<sup>67</sup>

### **A. Deprioritizing Adaptation**

The last budget request submitted to Congress by the Obama Administration maintained the Administration’s commitment to “increasing the resilience of communities—and the ecosystems upon which they depend—in the face of growing climate-related risks.” In the Obama Administration’s FY2017 budget proposal, the Administration acknowledged that “the effects of climate change, including more frequent and severe storms, floods, droughts, and wildfires, thawing permafrost, and sea level rise, are felt by communities, households, governments at all levels, and individuals who are on the front lines of the devastation these events often bring.” To address these effects, the Obama Administration sought to invest in projects designed to confront the challenges posed by climate change and “advance our scientific understanding of projected impacts, assist communities in planning and preparing for future risks, and deliver risk reduction and adaptation projects on the ground.” The budget stated that through “proactive investments in these areas, we can save lives and reduce long-term costs to families, communities and the Nation.”<sup>68</sup>

Despite prioritization by the Obama Administration, the Trump Administration has either proposed reducing or eliminating programs aimed at curtailing the effects of climate change. In the three fiscal year budget proposals publicly released by the Trump Administration, the term “climate change” is only used once. That reference is in relation to the Trump Administration’s proposal to eliminate the Environmental Protection Agency’s “Climate Change Research and Partnership Programs.”<sup>69</sup> The Trump Administration’s efforts to deprioritize climate change research, adaptation, and mitigation strategies could lead to increased recovery costs following extreme weather events and may prevent taxpayers from realizing savings possible through infrastructure investment opportunities.

A review of nine funding proposals within the Trump Administration’s annual budget documents shows that the Administration has significantly lowered the proposed budgets for multiple federal programs and offices promoting adaptation research and development efforts.

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<sup>67</sup> U.S. Government Accountability Office, *Climate Change: Analysis of Reported Federal Funding* (GAO-18-223) (Apr. 2018).

<sup>68</sup> The White House, *Budget of the U.S. Government Fiscal Year 2017* (ISBN 978-0-16-093131-4) (Feb. 9, 2016); also see The White House, *Analytical Perspectives Budget of the U.S. Government Fiscal Year 2017* (ISBN 978-0-16-093133-8) (Feb. 2016) including the following section: “Federal Budget Exposure to Climate Risk.”

<sup>69</sup> The White House, *Fiscal Year 2019 Efficient, Effective, Accountable: An American Budget* (ISBN 978-0-16-094480-2) (Feb. 2018); also see, The White House, *Budget of the U.S. Government A New Foundation for American Greatness Fiscal Year 2018* (ISBN 978-0-16-093922-8) (May 23, 2017), and The White House, *A Budget for a Better America Fiscal Year 2020* (ISBN 978-0-16-095071-1) (Mar. 11, 2019).

## 1. National Oceanic and Atmospheric Administration

The National Oceanic and Atmospheric Administration (NOAA) is the lead agency with the component responsible for calculating the financial costs of extreme weather events and supporting the U.S. Global Change Research Program’s *National Climate Assessment*.<sup>70</sup> See Figure 1. The Administration’s budgetary proposals would end most climate research programs within NOAA’s Climate Program Office. Additionally, “the budget would terminate the National Centers for Coastal Ocean Science, the National Sea Grant College Program, and some Arctic research products; decrease funding for ocean exploration and research efforts; and eliminate coastal zone management grants.”<sup>71</sup> In the Administration’s first budget proposal, FY2018, the Administration proposed cutting NOAA’s budget by more than \$1 billion, and has sought at least an additional \$300 million in total cuts from FY2019 to FY2020 budget proposals.<sup>72</sup> See Figure 1.

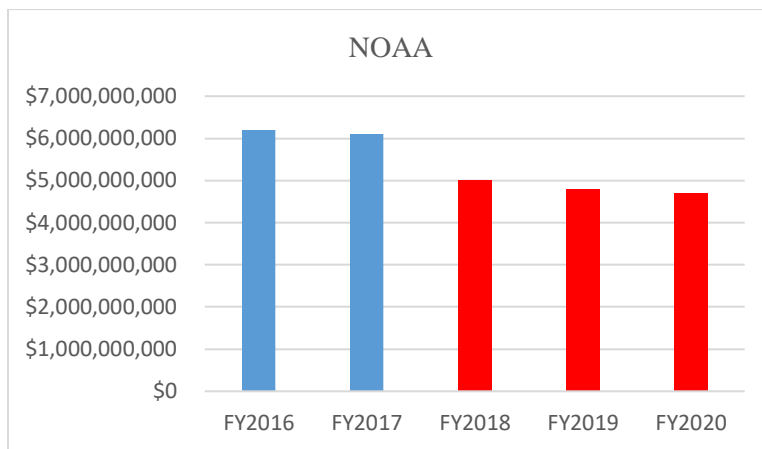


Figure 1

<sup>70</sup> See U.S. Global Change Research Program, Agencies, Department of Commerce ([www.globalchange.gov/agency/department-commerce](http://www.globalchange.gov/agency/department-commerce)) (accessed Apr. 3, 2019).

<sup>71</sup> *NOAA Budget Proposal Hits Rough Waters in Congress*, EOS (Mar. 28, 2019) ([eos.org/articles/noaa-budget-proposal-hits-rough-waters-in-congress](http://eos.org/articles/noaa-budget-proposal-hits-rough-waters-in-congress)).

<sup>72</sup> See Figure 1; and Department of Commerce, *Budget in Brief Fiscal Year 2016* (Feb. 2015); Department of Commerce, *Budget in Brief Fiscal Year 2017* (Feb. 2016); Department of Commerce, *Budget in Brief Fiscal Year 2018* (May 2017); Department of Commerce, *Budget in Brief Fiscal Year 2019* (Feb. 2018); and Department of Commerce, *Budget in Brief FY 2020* (Mar. 2019).

## 2. Environmental Protection Agency

The Environmental Protection Agency (EPA) is also responsible for developing climate change adaptation research and promoting mitigation and adaptation strategies. The EPA had its budget cut significantly in each of the Trump Administration’s proposals. The EPA states that the agency works to ensure that “[n]ational efforts to reduce environmental risks are based on the best available scientific information” and that “[e]nvironmental stewardship is integral to U.S. policies.”<sup>73</sup>

According to the EPA, its research “improves knowledge of the health and environment effects of climate change and provides sustainable solutions for communities to effectively manage and reduce the impacts of a changing climate.”<sup>74</sup> However, the Trump Administration’s cuts, both to the topline budget and also to specific programs at the EPA, undermine these goals. The Administration’s FY2020 proposal was over \$2 billion less than the Obama Administration’s final proposal, down from \$8.3 billion to \$6.1 billion.<sup>75</sup> In the FY2019 proposal, the Trump Administration proposed

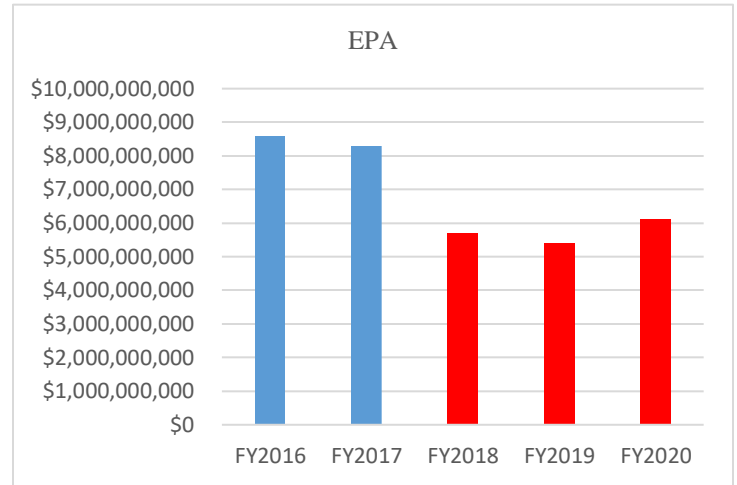


Figure 2

the elimination of EPA’s “Climate Change Research and Partnership Programs,” and did not mention it in their FY2020 proposals.<sup>76</sup> The EPA’s FY2018-2022 Strategic Plan does not mention climate change, indicating a significant reduction in focus on climate change and its impacts on the environment.<sup>77</sup> In all three EPA budget-in-brief proposals, the Administration has sought to eliminate the Global Change Research Office, a program that “develops scientific

<sup>73</sup> Environmental Protection Agency, About EPA, Our Mission and What We Do (<https://www.epa.gov/aboutepa/our-mission-and-what-we-do>) (accessed Apr. 15, 2019).

<sup>74</sup> Environmental Protection Agency, Climate Change Research (<https://www.epa.gov/climate-research>) (accessed Apr. 15, 2019).

<sup>75</sup> See The White House, *Fiscal Year 2016 Budget of the U.S. Government* (ISBN 978-0-16-092678-5) (Feb. 2, 2015); The White House, *Budget of the U.S. Government Fiscal Year 2017* (ISBN 978-0-16-093131-4) (Feb. 9, 2016); The White House, *Budget of the U.S. Government A New Foundation for American Greatness Fiscal Year 2018* (ISBN 978-0-16-093922-8) (May 23, 2017); The White House, *Fiscal Year 2019 Efficient, Effective, Accountable: An American Budget* (ISBN 978-0-16-094480-2) (Feb. 2018); The White House, *A Budget for a Better America Fiscal Year 2020* (ISBN 978-0-16-095071-1) (Mar. 11, 2019).

<sup>76</sup> See The White House, *Fiscal Year 2019 Efficient, Effective, Accountable: An American Budget* (ISBN 978-0-16-094480-2) (Feb. 2018); also The White House, *A Budget for a Better America Fiscal Year 2020* (ISBN 978-0-16-095071-1) (Mar. 11, 2019); The White House, *A Budget for a Better America Analytical Perspectives Fiscal Year 2020* (ISBN 978-0-16-095073-5) (Mar. 2019); Environmental Protection Agency, *FY2020 EPA Budget in Brief* (EPA-190-R-19-001) (Mar. 2019).

<sup>77</sup> Environmental Protection Agency, *Working Together FY 2018-2022 U.S. EPA Strategic Plan* (Feb. 2018).



information that supports policy makers, stakeholders, and society at large as they respond to climate change.”<sup>78</sup> See Figure 2.

### 3. NASA Earth Science Research

NASA’s Earth Science Research program is another source of integral information when it comes to understanding and adapting to climate change. Among other goals, one of the priorities of this program is studying climate variability and change, in which they work to understand “the roles of ocean, atmosphere, land, and ice in the climate system and improving our ability to predict future changes.”<sup>79</sup> The Obama Administration requested \$348 million for this program in FY2016, and increased that to \$360 million the following year. However, the Trump Administration proposed to cut the program by over \$70 million in their first year, and although their requests since then have been slightly higher, they are still over \$60 million less than the Obama Administration’s final request.<sup>80</sup> See Figure 3.

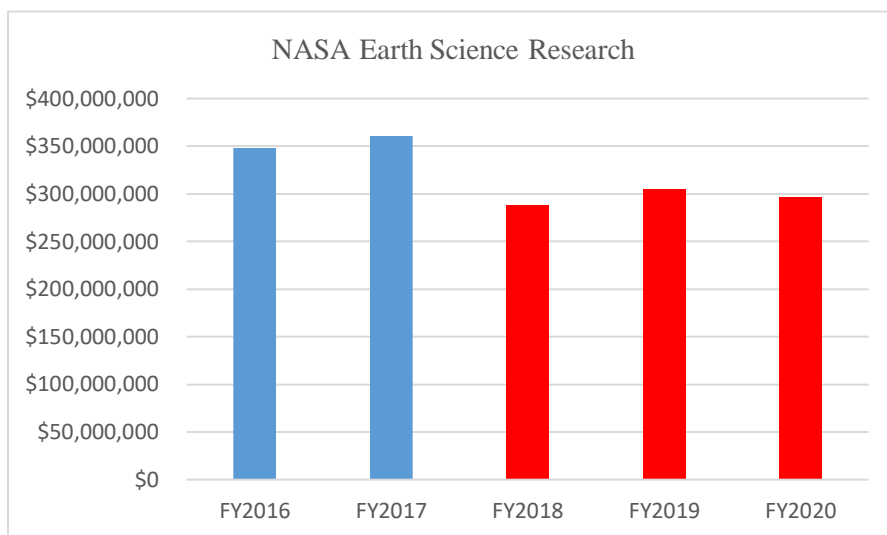


Figure 3

<sup>78</sup> See Environmental Protection Agency, *FY2018 EPA Budget in Brief* (EPA-190-K-17-001) (May 2017); Environmental Protection Agency, *FY2019 EPA Budget in Brief* (EPA-190-R-18-002) (Feb. 2018); Environmental Protection Agency, *FY2020 EPA Budget in Brief* (EPA-190-R-19-001) (Mar. 2019).

<sup>79</sup> National Aeronautics and Space Administration, *FY 2016 President’s Budget Request Summary* (2015).

<sup>80</sup> See Figure 3; and National Aeronautics and Space Administration, *FY 2016 President’s Budget Request Summary* (2015); National Aeronautics and Space Administration, *FY 2017 Budget Estimates* (2016); National Aeronautics and Space Administration, *FY 2018 Budget Estimates* (2017); National Aeronautics and Space Administration, *FY 2019 Budget Estimates* (2018); National Aeronautics and Space Administration, *FY 2020 Explore Budget Estimates* (2019).

#### 4. Department of the Interior Climate Adaptation Science Center

The Trump Administration has also deprioritized the Department of the Interior Climate Adaptation Science Center (DOI CASC). The DOI CASC is responsible for managing the eight regional DOI CASCs across the country. Working alongside regional CASC's, DOI CASC helps provide “resource managers and other stakeholders with information and decision-making tools to respond to the effects of climate change on fish, wildlife, ecosystems, and the communities they support.” DOI CASC also provides support to the U.S. Global Change Research Program.<sup>81</sup> Despite DOI CASC's mission to further adaptation efforts, the Trump Administration requested cutting the Center's budget by roughly \$13.5 million in their FY2018 budget. While the Administration raised their request in FY2020, after dropping it again in FY2019, the request does not match previous levels requested by the Obama Administration.<sup>82</sup> See Figure 4.

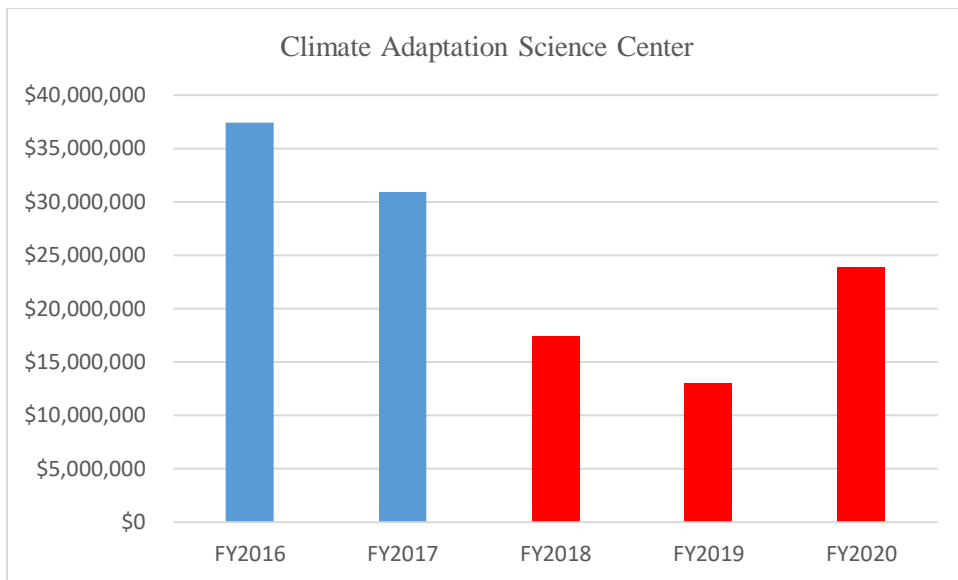


Figure 4

<sup>81</sup> U.S. Department of Interior, U.S. Geological Survey, Climate Adaptation Science Centers, About ([casc.usgs.gov/content/about](http://casc.usgs.gov/content/about)) (accessed Apr. 3, 2019); U.S. Global Change Research Program, Agencies, Department of the Interior ([www.globalchange.gov/agency/department-interior](http://www.globalchange.gov/agency/department-interior)) (accessed Apr. 3, 2019).

<sup>82</sup> See Figure 4, and Department of the Interior, *U.S. Geological Survey Budget Justifications and Performance Information Fiscal Year 2016* (2015); Department of the Interior, *U.S. Geological Survey Budget Justifications and Performance Information Fiscal Year 2017* (2016); Department of the Interior, *U.S. Geological Survey Budget Justifications and Performance Information Fiscal Year 2018* (2017); Department of the Interior, *U.S. Geological Survey Budget Justifications and Performance Information Fiscal Year 2019* (2018); and Department of the Interior, *U.S. Geological Survey Budget Justifications and Performance Information Fiscal Year 2020* (2019).

## 5. Department of the Interior Bureau of Land Management Climate Change Program

The Bureau of Land Management (BLM) Climate Change Adaptation Program, within the Department of the Interior, is also facing proposed budget cuts. While the Obama Administration sought to focus the program on helping shape the Interior Department’s agency-wide and regional adaptation measures with consideration for the impacts of climate change, the proposals by the Trump Administration would further limit adaptation planning within the federal government. Instead of maintaining funding at levels commensurate with the Obama Administration, the Trump Administration has not requested any funding for the program.<sup>83</sup> See Figure 5.

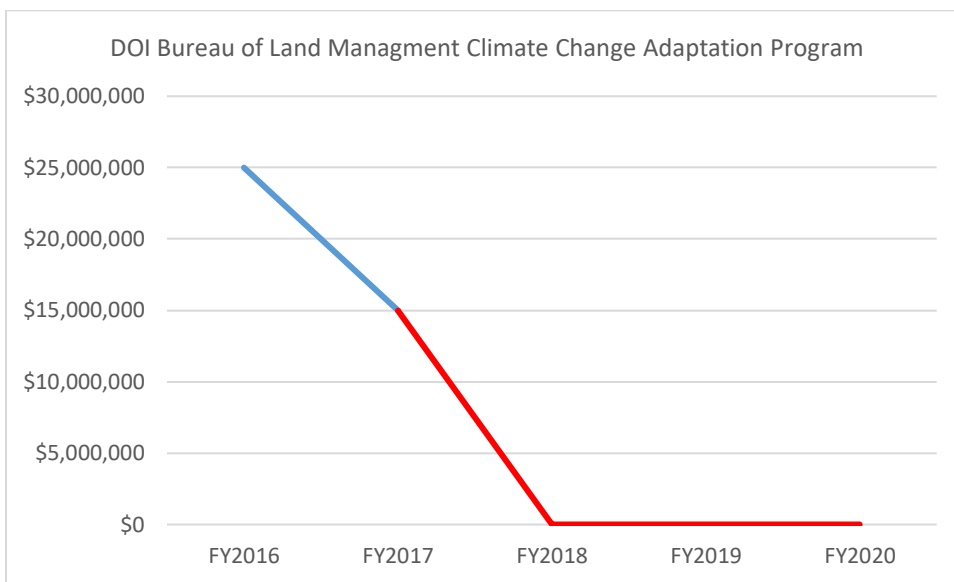


Figure 5

<sup>83</sup> See Figure 5; and Department of the Interior, *Bureau of Land Management Budget Justifications and Performance Information Fiscal Year 2016* (2015); Department of the Interior, *Bureau of Land Management Budget Justifications and Performance Information Fiscal Year 2017* (2016); Department of the Interior, *Bureau of Land Management Budget Justifications and Performance Information Fiscal Year 2018*; Department of the Interior, *Bureau of Land Management Budget Justifications and Performance Information Fiscal Year 2019* (2018); Department of the Interior, *Bureau of Land Management Budget Justifications and Performance Information Fiscal Year 2020* (2019).

## 6. Department of Energy Office of Energy Efficiency and Renewable Energy

In December 2016, the Department of Energy (DOE), Sustainability Performance Office, released the *DOE Climate Change Adaptation Plan: 2016 Interim Update*.<sup>84</sup> The document included information about DOE efforts to incorporate climate risk management into DOE's decision making process and promote climate adaptation planning. One office within DOE, the Office of Energy Efficiency and Renewable Energy (EERE), was highlighted for its work funding an array of innovations, including renewable energy, transportation improvements, and energy efficiency measures. Through EERE's work, DOE has emphasized the EERE's ability to "improve resilience and mitigate the impacts of extreme weather events by continuing to provide electricity and thermal service in the absence of grid electricity."<sup>85</sup> The Obama Administration requested close to \$3 billion for EERE in FY2016 and FY2017.<sup>86</sup> However, the Trump Administration has deemphasized EERE, cutting the office's budget request by more than \$2.5 billion between FY2017 and FY2020.<sup>87</sup> See Figure 6.

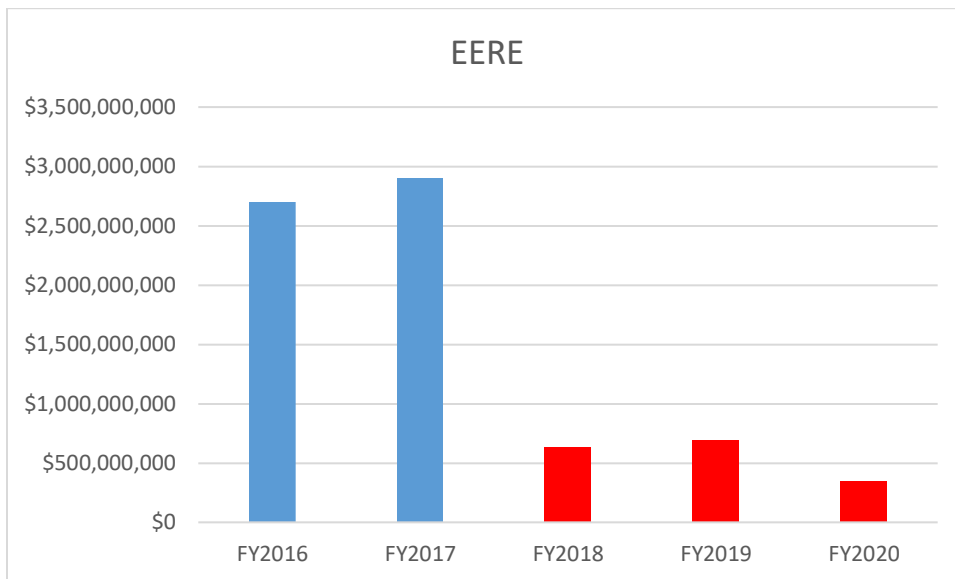


Figure 6

<sup>84</sup> Department of Energy, *DOE Climate Change Adaptation Plan 2016 Interim Update* (Dec. 2016).

<sup>85</sup> Department of Energy, *DOE Climate Change Adaptation Plan 2016 Interim Update* (Dec. 2016).

<sup>86</sup> See Figure 6; and Department of Energy, *FY 2016 Summary Table by Organization* (2015); Department of Energy, *FY 2017 Summary Table by Organization* (2016).

<sup>87</sup> See Figure 6; Department of Energy, *FY 2018 Summary Table by Organization* (2017); Department of Energy, *FY 2019 Summary Control Table by Organization* (2018); and Department of Energy, *FY 2020 Summary Table by Organization* (2019).

## 7. Federal Emergency Management Agency Flood Hazard Mapping Program

The Federal Emergency Management Agency (FEMA) operates a flood hazard mapping program that “identifies flood hazards, assesses flood risks and partners with states and communities to provide accurate flood hazard and risk data to guide them to mitigation actions.”<sup>88</sup> While the Obama Administration sought more than \$270 million in funding for the program, Congress only approved a little over \$170 million. Their subsequent request reflected the enacted funding level from the prior fiscal year.<sup>89</sup> Instead of seeking similar levels, however, the Trump Administration sought to drastically cut the flood hazard mapping program’s funding, including a request in FY2018 to eliminate the program’s funding entirely.<sup>90</sup> While the Trump Administration requested funds for the program in FY2019 and FY2020, the requests fall far short of those sought by the Obama Administration.<sup>91</sup> See Figure 7.

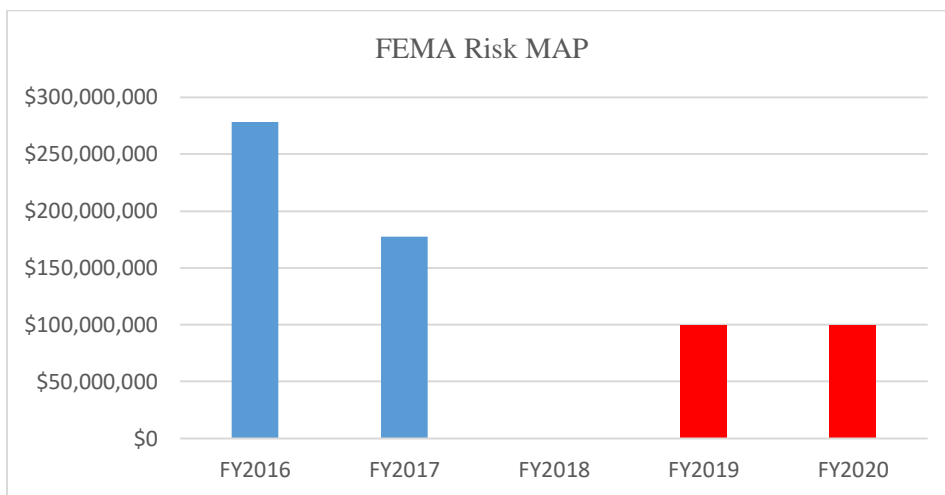


Figure 7

<sup>88</sup> U.S. Department of Homeland Security, Federal Emergency Management Agency, National Flood Insurance Program: Flood Hazard Mapping ([www.fema.gov/national-flood-insurance-program-flood-hazard-mapping](http://www.fema.gov/national-flood-insurance-program-flood-hazard-mapping)) (accessed Apr. 4, 2019).

<sup>89</sup> See Department of Homeland Security, *Budget-in-Brief Fiscal Year 2016* (Feb. 2015); and Department of Homeland Security, *Congressional Budget Justification FY 2017–Volume III* (Feb. 2016).

<sup>90</sup> Department of Homeland Security Federal Emergency Management Agency, *Budget Overview Fiscal Year 2018 Congressional Justification* (May 2017). See “The FY 2018 request includes a decrease of \$189.6 million for the elimination of appropriated discretionary funding to support the Flood Hazard Mapping and Risk Analysis Program (Risk MAP). Starting in FY 2018, funding for Risk MAP would be supported entirely from surcharges and fees collected from NFIP policyholders. Flood maps most benefit NFIP policyholders and communities at risk of flooding; therefore mapping costs should be borne by flood insurance policyholders, not general taxpayers. To complement FEMA’s efforts, State and local governments are also able to invest their own resources in updating flood maps to inform land use decisions and reduce risk.”

<sup>91</sup> See Figure 7; and Department of Homeland Security Federal Emergency Management Agency, *Budget Overview Fiscal Year 2018 Congressional Justification* (May 2017); Department of Homeland Security Federal Emergency Management Agency, *Budget Overview Fiscal Year 2019 Congressional Justification* (Feb. 2018); and Department of Homeland Security Federal Emergency Management Agency, *Budget Overview Fiscal Year 2020 Congressional Justification* (Mar. 2019).

## 8. Department of Commerce Economic Development Administration

The Trump Administration has also sought to eliminate the Economic Development Administration (EDA), a bureau located within the Department of Commerce, which provides grants to communities to “enhance utility and transportation lifeline facilities.” The EDA’s grant adaptation efforts have included “the elevation of roads, railroads, electrical substations, water pumping stations, and other infrastructure to better resist flood[ing], and to move electrical transmission lines underground to better resist wind and ice loads.” These adaptation grants are a vital source of funding for projects seeking to decrease extreme weather event damage and save recovery dollars.<sup>92</sup> The Trump Administration has sought the elimination of EDA in all three of its fiscal year budget proposals, requesting only funding levels necessary for EDA to cease operations.<sup>93</sup> See Figure 8.

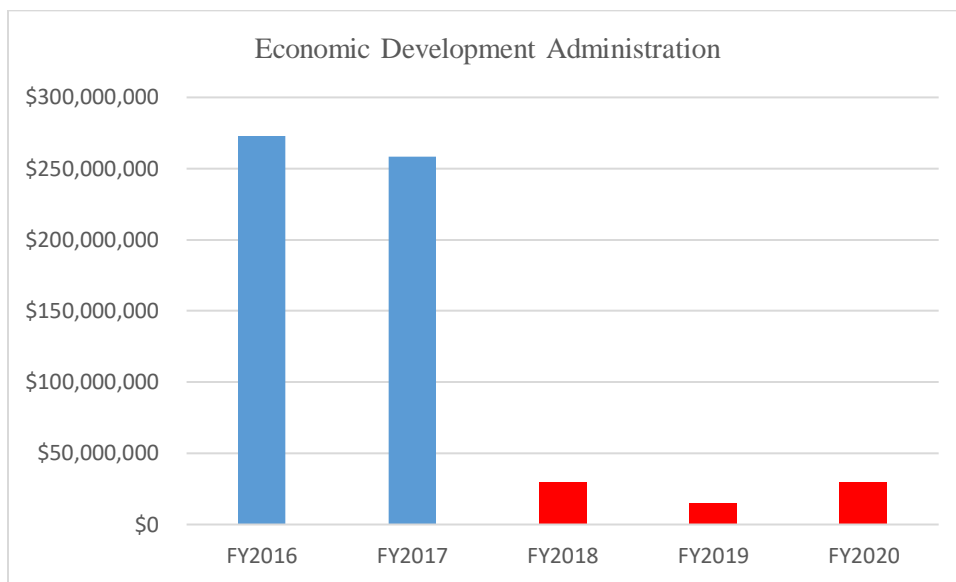


Figure 8

<sup>92</sup> National Institute of Building Sciences, *Natural Hazard Mitigation Saves: 2018 Interim Report* (Dec. 2018).

<sup>93</sup> See Figure 8; and Department of Commerce, *Budget in Brief Fiscal Year 2016* (Feb. 2015); Department of Commerce, *Budget in Brief Fiscal Year 2017* (Feb. 2016); Department of Commerce, *Budget in Brief Fiscal Year 2018* (May 2017); Department of Commerce, *Budget in Brief Fiscal Year 2019* (Feb. 2018); and Department of Commerce, *Budget in Brief FY 2020* (Mar. 2019).

## 9. Department of Housing and Urban Development Community Development Block Grant Program

The Community Development Block Grant Program (CDBG), offered through the Department of Housing and Urban Development (HUD), has also been proposed for elimination under the current Administration.<sup>94</sup> HUD's CDBG National Disaster Resilience Competition develops collaboration on regional interdependencies, coordination, and resilience locally and nationally.<sup>95</sup> CDBG's competition has awarded close to \$1 billion to promote adaptation and resiliency efforts.<sup>96</sup> The program has not made any awards since the Trump Administration began, and all three of the Administration's fiscal year budget proposals sought to eliminate the program.<sup>97</sup> See Figure 9.

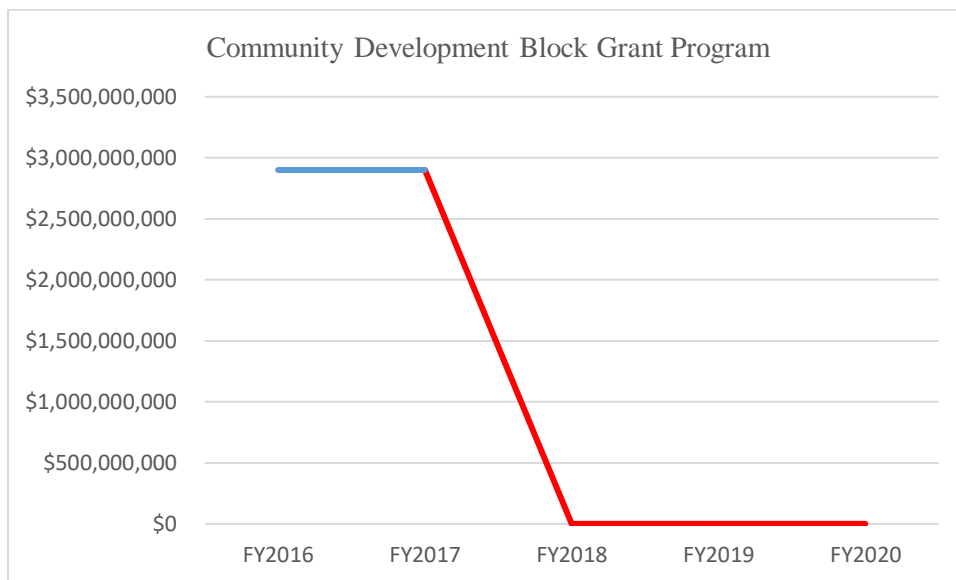


Figure 9

<sup>94</sup> See U.S. Department of Housing and Urban Development, *Fiscal Year 2018 Congressional Justifications* (May 2017); U.S. Department of Housing and Urban Development, *FY2019 Congressional Justifications* (Feb. 2018); and U.S. Department of Housing and Urban Development, *FY2020 Congressional Justifications* (Mar. 2019).

<sup>95</sup> U.S. Global Change Research Program, *2018: Impacts, Risks, and Adaptation in the United States: Fourth National Climate Assessment, Volume II* (nca2018.globalchange.gov/) (Nov. 2018).

<sup>96</sup> U.S. Department of Housing and Urban Development, Community Development Block Grant, National Disaster Resilience ([www.hudexchange.info/programs/cdbg-dr/resilient-recovery/](http://www.hudexchange.info/programs/cdbg-dr/resilient-recovery/)) (accessed Apr. 3, 2019).

<sup>97</sup> See Figure 9; and Department of Housing and Urban Development, *Congressional Justifications FY2016* (Feb. 2015); U.S. Department of Housing and Urban Development, *Fiscal Year 2017 Congressional Justifications* (Feb. 2016); U.S. Department of Housing and Urban Development, *Fiscal Year 2018 Congressional Justifications* (May 2017); U.S. Department of Housing and Urban Development, *FY2019 Congressional Justifications* (Feb. 2018); and U.S. Department of Housing and Urban Development, *FY2020 Congressional Justifications* (Mar. 2019).

## **B. Limiting Availability of Information**

The Trump Administration has made it more difficult to identify the funding request levels of some programs and offices that focused, at least in part, on climate change adaptation measures. For example, the United States Army Corps of Engineers (USACE) Responses to Climate Change Program works to develop resilience strategies for USACE projects based on the impacts of climate change. The Obama Administration requested \$6 million for the program in both FY2016 and FY 2017.<sup>98</sup> However, available Trump Administration budget requests do not mention the program, making it more difficult to decipher any funding for the program.<sup>99</sup>

The Department of Transportation Federal Highway Authority Environmental Sustainability program also works on climate adaptation measures.<sup>100</sup> The work is related to the country's transportation infrastructure. In FY2017, \$8 million was requested for the program. However, subsequent budget requests from the Trump Administration have limited reporting on funding requests for the program.<sup>101</sup> In another example, the United States Department of Agriculture Climate Change Program also focuses on climate adaptation measures, examining the implications of climate change on agriculture and rural communities. Despite a FY2017 funding request of \$3 million, the Trump Administration has yet to clearly specify its funding requests for the program.<sup>102</sup>

For research that is part of the USGCRP, the President is required to provide Congress with specific budgetary information. Under the Global Change Research Act of 1990, which established the USGCRP, the President is required to provide budget estimates for each agency and department involved in the USGCRP. Specifically, in each annual budget submission to Congress, the President is required to provide opportunity for comment on each budget estimate

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<sup>98</sup> U.S. Army Corps of Engineers, *Fiscal Year 2016 Civil Works Budget Details Volume II* (2015); U.S. Army Corps of Engineers, *Fiscal Year 2017 Operations & Maintenance with National Program O&M* (2016).

<sup>99</sup> See U.S. Army Corps of Engineers, *Fiscal Year 2018 Operations & Maintenance with National Program O&M* (2017); U.S. Army Corps of Engineers, *Fiscal Year 2019 Operation and Maintenance* (2018).

<sup>100</sup> See Department of Transportation, *FHWA FY 2016 Budget* (2015); Department of Transportation, *FHWA FY 2017 Budget* (2016).

<sup>101</sup> See Department of Transportation, *FHWA FY 2016 Budget* (2015); Department of Transportation, *FHWA FY 2017 Budget* (2016); Department of Transportation, *FHWA FY 2018 Budget* (2017); Department of Transportation, *FHWA FY 2019 Budget* (2018); Department of Transportation, *FHWA FY 2020 Budget* (2019).

<sup>102</sup> See US Department of Agriculture, *2016 Explanatory Notes Office of the Chief Economist* (2015); US Department of Agriculture, *2017 President's Budget Office of the Chief Economist* (2016); US Department of Agriculture, *2018 President's Budget Office of the Chief Economist* (2017); US Department of Agriculture, *2019 President's Budget Office of the Chief Economist* (2018); US Department of Agriculture, *2020 USDA Explanatory Notes – Office of the Chief Economist* (2019).



and identify any items in an “agency’s or department’s budget which are elements of the Program.”<sup>103</sup> To date, the Trump Administration has failed to comply with this requirement.<sup>104</sup>

The requested budget cuts to the nine programs and entities examined above total over \$9.4 billion from FY2017 to FY2020.<sup>105</sup> See Figure 10. The Trump Administration’s efforts to deprioritize climate adaptation strategies and eliminate related funding run counter to research, which finds that “well-timed adaptation could reduce over 75% of the cumulative impacts to coastal properties, roads, and the rail system in the U.S., resulting in hundreds of billions of dollars in cumulative benefits this century.”<sup>106</sup> The Administration’s proposed divestment of climate adaptation and research and grant program funding could ultimately cost American taxpayers billions in adaptation savings.<sup>107</sup>

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<sup>103</sup> The Global Change Research Act of 1990, Pub. L. 101-606, Sec. 105 (Nov. 16, 1990).

<sup>104</sup> Congressional Research Service, *Budget Estimates for the U.S. Global Change Research Program (USGCRP)* (Apr. 16, 2019). Communication to U.S. Senate Homeland Security and Governmental Affairs Committee, Minority Staff, stating:

The USGCRP has not reported since 2016 its annual budget authority (or budget requests) on its website or in reports. The Global Change Research Act of 1990 (P.L. 101-106), in Section 105, requires annual budget reporting from agencies or departments (hereafter “agencies”) involved in global change research (which includes climate change). Those agencies must also submit annual appropriations requests on each element of their proposed research activities. Section 107 requires the Chair of the Federal Coordinating Council on Science, Engineering, and Technology to submit annually to Congress a report on amounts spent during the fiscal year most recently ended and the preceding fiscal year, as well as the amounts requested for the fiscal year for which the President’s budget is being submitted. The Act requires that this annual report to Congress be submitted each year at the time that the President submits his budget. In the past, the USGCRP submitted the report *Our Changing Planet* to fulfill this requirement, typically around May of each year; the most recent version (2016) for FY 2017 was published at the end of FY 2016. As of the writing of this memorandum, no more recent *Our Changing Planet* or other report is available on the website of the UGCRP providing the budgetary information in detail or in summary. Nor did searches in the website’s search engine identify the budgetary information for FY 2018, FY 2019, or the FY 2020 request.

<sup>105</sup> See Figure 10; The White House, *Budget of the U.S. Government Fiscal Year 2017* (ISBN 978-0-16-093131-4) (Feb. 9, 2016); The White House, *Analytical Perspectives Budget of the U.S. Government Fiscal Year 2017* (ISBN 978-0-16-093133-8) (Feb. 2016); The White House, *Budget of the U.S. Government A New Foundation for American Greatness Fiscal Year 2018* (ISBN 978-0-16-093922-8) (May 23, 2017); The White House, *Analytical Perspectives Budget of the U.S. Government Fiscal Year 2018* (ISBN 978-0-16-093934-1) (May 2017); The White House, *Fiscal Year 2019 Efficient, Effective, Accountable: An American Budget* (ISBN 978-0-16-094480-2) (Feb. 2018); The White House, *Fiscal Year 2019 Efficient, Effective, Accountable: An American Budget Analytical Perspectives* (ISBN 978-0-16-094482-6) (Feb. 2018); The White House, *A Budget for a Better America Fiscal Year 2020* (ISBN 978-0-16-095071-1) (Mar. 11, 2019); The White House, *A Budget for a Better America Analytical Perspectives Fiscal Year 2020* (ISBN 978-0-16-095073-5) (Mar. 2019).

<sup>106</sup> U.S. Global Change Research Program, *The Multi-Model Framework for Quantitative Sectoral Impacts Analysis: A Technical Report for the Fourth National Climate Assessment* (EPA 430-R-17-001) (May 2017).

<sup>107</sup> The NIBS 6:1 BCR applies to funding obtained through federal adaptation grants, or as NIBS refers to them, “federal mitigation grants.” See National Institute of Building Sciences, *Natural Hazard Mitigation Saves: 2018 Interim Report* (Dec. 2018).

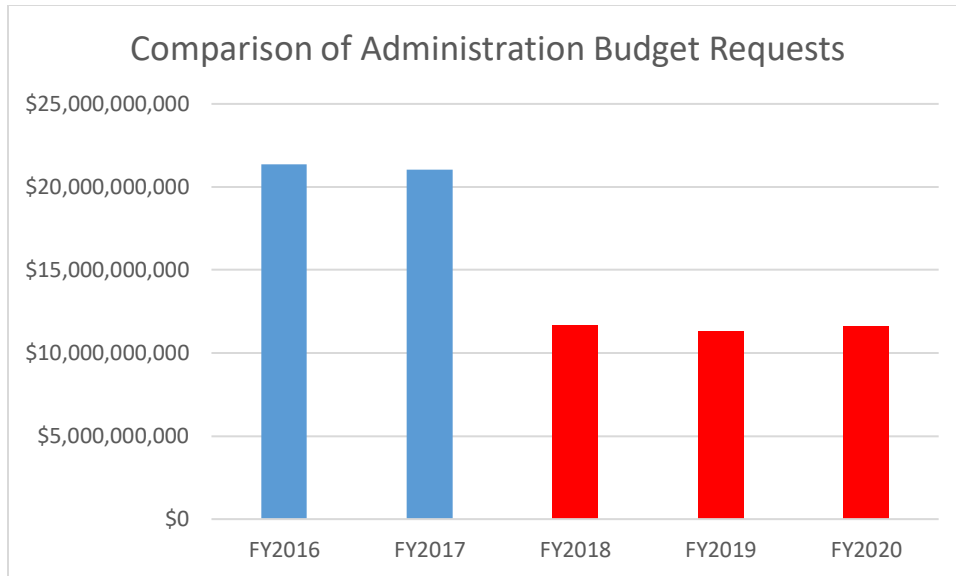


Figure 10

## CONCLUSION

The costs of climate change will likely soon exceed half a trillion dollars in disaster assistance alone since 2005. With extended periods of high temperatures, tropical cyclones, extreme precipitation, flooding, and droughts, lagging efforts to adapt our country’s infrastructure will become increasingly apparent. Deteriorating infrastructure and the damage done by extreme weather events results in high and ever increasing financial costs to the federal government, state and local entities, and taxpayers. Additionally, extreme weather events can have disproportionate effects, and can also devastate communities, causing emotional and physical ailments. Access to clear roads, emergency services, and hospitals during such events is critical. The increased pressures of climate change place our country’s critical infrastructure at risk, and adapting our infrastructural environment is an important step in addressing the impacts of extreme weather events.

Findings by the USGCRP, NIBS, and other federally funded research programs demonstrate that mitigation and adaptation strategies could potentially save billions in taxpayer dollars on the federal response to increased flooding, catastrophic hurricanes, and related extreme weather caused by climate change. In particular, for every \$1 spent adapting our country’s infrastructure through federal mitigation (or adaptation) grants, savings ranging from \$4 to \$11 can be realized as a result. Investing in our infrastructure strengthens existing structures and lowers the financial cost of recovery efforts following extreme weather events. According to research by NIBS, review of a twenty-three year period of federal grant program spending on mitigation (or adaptation) efforts showed more than \$150 billion in potential benefits associated with a \$27.4 billion investment.

The Trump Administration’s failure to provide information on climate change funding, including on federal domestic disaster assistance, flood insurance, and crop insurance, together with its attempts to limit or eliminate funding to reduce the economic impacts of climate change threatens the country’s long-term economic stability. The Trump Administration has not only

sought to limit our country's ability to study and plan for the impacts of climate change, but has also hindered state and local efforts to adapt to a changing climate. Instead of accepting the Trump Administration's budget priorities, Congress should work to improve the federal government's ability to adapt our nation's infrastructure to confront the impacts of climate change. In so doing, our country can lower the financial costs associated with the aftermath of extreme weather events and save billions in taxpayer dollars.

To better safeguard taxpayer dollars, address the risks created by the Administration's refusal to invest in mitigation and adaptation strategies, and to help better plan for future economic, health, and related risks due to the costs associated with climate change, this report makes the following recommendations:

1. The Administration should commit to publishing accurate accounting information on climate change funding. To ensure an accurate accounting, the Administration should adhere to the recommendations of GAO to implement the appropriate federal accounting protocols to measure the costs associated with the impacts of climate change.
2. The Administration should amend its FY2020 budget proposal to restore previous funding levels for the programs and offices identified in this report and similarly focused programs and offices and assess whether increased budgetary commitments are needed beyond previously requested levels. Any assessment on whether to increase or decrease funding levels for these programs and offices should be accompanied by an explanatory report, delivered to Congress, including specific reasons for increases or decreases, and explaining how such requests affect our country's ability to adapt to climate change.
3. Congress should improve existing adaptation and grant funding programs and, where needed, expand federal adaptation grant funding to improve our country's infrastructure and reduce the financial recovery costs of extreme weather events for taxpayers.
4. Congress should act to ensure that the Administration begins complying with the requirements of the Global Change Research Act of 1990 and publicly reports on funding requests and allocations for research required under the Act.