Federal Accounting Standards Advisory Board

November 25, 2020

MEMBER ACTIONS REQUESTED:

Please review the materials in preparation for this education session

Memorandum

To: Members of the Board

From: Robin M. Gilliam, Assistant Director

Through: Monica R. Valentine, Executive Director

Subject: Education Session: Fiscal Exposure and Climate Risk for the Federal Government– **TAB F**[1]

MEETING OBJECTIVE

To educate members on the fiscal exposure and climate risk for the Federal government.

BRIEFING MATERIALS

The briefing materials include this memorandum and the following:

- **Attachment 1:** Presenters' PowerPoint Slides
- **Appendix A:** *GAO's Ongoing, Potential, and Recent Climate Change Work*

You may electronically access all of the briefing material at https://fasab.gov/board-activities/briefing-materials/.

[1] The staff prepares Board meeting materials to facilitate discussion of issues at the Board meeting. This material is presented for discussion purposes only; it is not intended to reflect authoritative views of the FASAB or its staff. Official positions of the FASAB are determined only after extensive due process and deliberations.

BACKGROUND

There is a significant amount of work being done in the federal government to address fiscal risk and the impact of climate change. For example, the National Oceanic and Atmospheric Administration (NOAA), National Centers for Environmental Information (NCEI) tracks the number, cost, and deaths related to weather and climate disasters in their billion-dollar product. https://www.ncdc.noaa.gov/billions/ states that "The U.S. has sustained 279 weather and climate disasters since 1980 where overall damages/costs reached or exceeded $1 billion (including CPI adjustment to 2020). The total cost of these 279 events exceeds $1.825 trillion."

In addition, as a result of GAO climate reports, *completed, in-progress, and soon to be staffed* (please see Appendix A), many agencies are now monitoring the impact of climate change to determine next steps to protect federal plant, property, and equipment (PP&E) through adaption and resilience, such as the U.S. General Services Administration (GSA).

Staff presents this education session to help members gain an understanding of the fiscal exposure and climate risk for the federal government. The education session panelists are experts in their field and excited to share the climate work they are engaged in with the Board.

Panelists' Biographies (in order of presenter)

Adam Smith is lead scientist for NOAA's U.S. Billion-dollar Weather and Climate Disasters research, analysis and public/private data partnerships (www.ncdc.noaa.gov/billions). Over the last decade Mr. Smith has developed leading research, new data partnerships and gained national and international experience merging environmental and social science data from across NOAA, the federal government, and industry. He performs research to homogenize and transition disparate disaster data sources into better quality-controlled disaster cost frameworks, as research tools. He presents this research at public and private sector conferences, national media, insurance industry conferences, and international audiences, Office of Science and Technology Policy (OSTP) Subcommittee on Disaster Reduction, among many others. Mr. Smith actively works on several national and international expert tasks teams, and with NOAA and academic scientists on numerous new research publications.

J. Alfredo Gómez serves as a Director in the Natural Resources and Environment team of the U.S. Government Accountability Office (GAO). He manages the team's work in environmental protection issues. His portfolio includes work in cleanup of hazardous substances, drinking and clean water issues, ecosystem restoration, pesticides, toxic chemicals, climate change, and EPA-wide management issues. Mr. Gómez has produced numerous reports and testimonies addressing a wide range of environmental, natural resource, agency management, and food safety issues. Mr. Gómez began his GAO career in the Chicago Regional Office in 1991, working on environmental protection issues. He left GAO to work for the Honolulu City Council where he audited local government agencies, and subsequently returned to GAO in 1998. Mr. Gómez holds a bachelor's degree in Chemical Engineering from Rice University and a master's degree in Public Policy Studies from the University of Chicago.

Joe Thompson is an Assistant Director in GAO's Natural Resources and Environment team. He coordinates GAO's climate change and air pollution work and has been at GAO for over 18 years. Mr. Thompson has a BS in environmental policy from the University of Michigan-Ann Arbor and a Master of Public Affairs from the University of Wisconsin-Madison.

Ann Kosmal, is an architect at GSA's Office of Federal High-Performance Buildings. Ms. Kosmal safeguards assets from the observed and expected changes in climate for prudent investment, risk management, and augments life safety, public safety, health and security. She prompts design innovation and bolsters our Nation's global competitiveness in the emerging sector of climate security which cannot be off-shored or outsourced. Ann is a co-author of the Fourth National Climate Assessment's Built Environment chapter. She is also Certified Passive House Consultant (CPHC) and Permaculturist.

MEMBER QUESTIONS:

The panelists will present consecutively for approximately one hour. Members will then have ½ hour to ask questions to the presenters.

NEXT STEPS: Directly following this education session staff will present a technical plan in Tab G to propose a Climate Impact and Risk Reporting project.

FASAB
DECEMBER 2020
TAB F: APPENDIX A

GAO's Ongoing, Potential, and Recent Climate Change Work

Ongoing Work

1. **DOD Climate Resilience Enhancement with Surrounding Communities**
   - *Requester – Senator Reed*
   - *Projected Issue Date – (Fall 2020)*
2. **Electric Grid Climate Resilience**
   - *Requester – Senators Carper and Manchin*
   - *Projected Issue Date – (Spring 2021)*
3. **TSP Exposure to Climate Risks**
   - *Requesters – Senators Merkley and Hassan*
   - *Projected Issue Date – (Spring 2021)*
4. **Climate Resilient Federally Funded Roads**
   - *Requesters – Senator Cardin, Representatives Bernice Johnson, Foster, and Sherrill*
   - *Projected Issue Date –* (Spring *2021)*
5. **Natural Disaster Resilience in Federal Asset Management**
   - *Requesters – Senators Johnson, Carper, and Peters*
   - *Projected Issue Date – (Spring 2021)*
6. **Climate Resilient Chemical Facilities**
   - *Requester – Senators Carper and Booker*
   - *Projected Issue Date – (Summer 2021)*
7. **Flooding and Erosion in Alaska Native Villages**
   - *Requesters – Senators Barrasso and Carper, Representatives DeFazio and Graves*
   - *Projected Issue Date – (Summer 2021)*
8. **Sea Level Rise, Extreme Events, and Nuclear Waste Storage**
   - *Requester – Senator Carper*
   - *Projected Issue Date – (Unknown, Recently Staffed)*
9. **Agriculture Capacity to Reduce Greenhouse Gas Emissions and Store Carbon**
   - *Requester – Representatives Pingree and Fortenberry*
   - *Projected Issue Date – (Unknown, Recently Staffed)*
10. **Climate Resilient Post Office Facilities and Operations**
    - *Requesters – Representatives Maloney and Connelly*
    - *Projected Issue Date – (Unknown, Recently Staffed)*

Requests Accepted – To Be Staffed Soon

11. **Climate Change, Wildfires, and Air Pollution**
    - *Requesters – Representatives Sherrill, Lofgren, Bonamici, Bera, Sherman, McNerney, Perlmutter, and McAdams*
12. **Climate Resilient Flood Risk Infrastructure (Army Corps Levees)**
    - *Requester – Senators Carper and Duckworth*
13. **Hazardous Material Disposal (RCRA) and Climate Change**
    - *Requester – Senators Carper and Booker*
14. **Climate Ready Fisheries**
    - *Mandate*
15. **Climate Change Impacts on Recreational Boating Economy**
    - *Mandate*

Potential Requests

A. International Water Management Practices and Long-Term Drought
B. Geoengineering Research and Governance
C. Coral Reef Protection Strategies
D. Framework for Collecting and Allocating Carbon Tax Revenue
E. Passenger Rail, Air Transportation Infrastructure, and Port Resilience
F. USGCRP and Federal Efforts to Respond to Climate Change

Selected Recent Reports

- Climate Change: USAID Is Taking Steps to Increase Projects' Resilience, but Could Improve Reporting of Adaptation Funding (7/21/20, GAO-20-555)
- Climate Change: A Climate Migration Pilot Program Could Enhance the Nation's Resilience and Reduce Federal Fiscal Exposure (7/6/20, GAO-20-488)
- Climate Resilience: Actions Needed to Ensure DOD Considers Climate Risks to Contractors as Part of Acquisition, Supply, and Risk Assessment (6/25/20, GAO-20-511)
- Social Cost of Carbon: Identifying a Federal Entity to Address the National Academies' Recommendations Could Strengthen Regulatory Analysis (6/23/20, GAO-20-254)
- Water Infrastructure: Technical Assistance and Climate Resilience Planning Could Help Utilities Prepare for Potential Climate Change Impacts (1/16/20, GAO-20-24)
- Climate Resilience: A Strategic Investment Approach for High Priority Projects Could Help Target Federal Resources (10/23/19, GAO-20-127)
- Disaster Resilience Framework: Principles for Analyzing Federal Efforts to Facilitate and Promote Resilience to Natural Disasters (10/23/19, GAO-20-100SP)
- Superfund: EPA Should Take Additional Actions to Manage Risks from Climate Change (10/18/19, GAO-20-73)
- Climate Resilience: DOD Needs to Assess Risk and Provide Guidance on Use of Climate Projections in Installation Master Plans and Facilities Designs (6/12/19, GAO-19-453)

- 2019 High Risk Update, Limiting the Federal Government's Fiscal Exposure by Better Managing Climate Change Risks (3/6/19, GAO-19-157SP)
- Climate Change: Activities of Selected Agencies to Address Potential Impact on Global Migration (1/17/19, GAO-19-166)
- Climate Change: Analysis of Reported Funding (4/30/18, GAO-18-223)
- Climate Change Adaptation: DOD Needs to Better Incorporate Adaptation into Planning and Collaboration at Overseas Installation (11/13/17, GAO-18-206)
- Climate Change: Information on Potential Economic Effects Could Help Guide Federal Efforts to Reduce Fiscal Exposure (9/28/17, GAO-17-720)
- Climate Change: Improved Federal Coordination Could Facilitate Use of Forward-Looking Climate Information in Design Standards, Building Codes, and Certifications (11/30/16, GAO-17-3)
- Federal Disaster Assistance: Federal Departments and Agencies Obligated at Least $277.6 Billion during Fiscal Years 2005 through 2014 (9/22/16, GAO-16-797)
- Climate Information: A National System Could Help Federal, State, Local, and Private Sector Decision Makers Use Climate Information (11/23/15, GAO-16-37)
- Hurricane Sandy: An Investment Strategy Could Help the Federal Government Enhance National Resilience for Future Disasters (6/30/15, GAO-15-515)

FASAB Education Session:
Fiscal Exposure & Climate Risk for the Federal Government

Thursday December 16, 2020
9:30 – 11:00am
TAB F - Attachment 1

AGENDA

9:30 – 10:30am

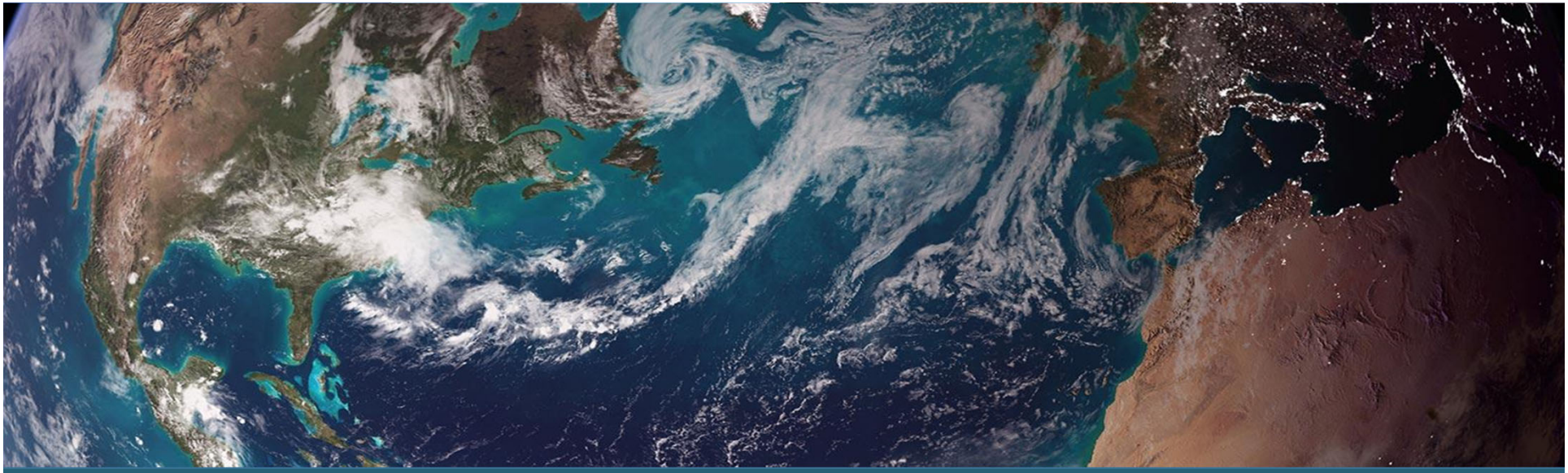
- Robin Gilliam – Introduction/ Educational Goal
- **NOAA: Adam Smith** – U.S. Billion-dollar Weather and Climate Disasters
- **GAO: Alfredo Gómez**– Limiting the Federal Government's Fiscal Exposure By Better Managing Climate Change Risks
- **GAO: Joe Thompson** – GAO's Climate Change Adaptation Work
- **GSA: Ann Kosmal** – Adaption & Resilience Work at GSA

10:30 – 11:00am

- Member questions

ADAM SMITH

Applied Climatologist
Center for Weather and Climate
National Centers for Environmental Information
National Oceanic and Atmospheric Administration



U.S. Billion-dollar Weather and Climate Disasters (1980-2020)

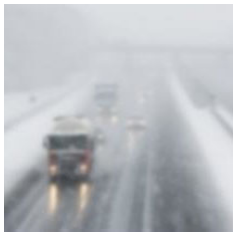
Better understanding U.S. disaster costs over space and time

Adam B. Smith, Applied Climatologist

NOAA National Centers for Environmental Information (NCEI)

Center for Weather and Climate




U.S. Billion-dollar Weather and Climate Disasters

Outline:

- **Context for Measuring Disaster Impact**
- Data Sources / What we are Measuring
- 2020 U.S. Disasters in Review…
- Disaster Cost Comparison and New Tools

NOAA's National Centers for Environmental Information (NCEI) – Center for Weather and Climate

- Statutory mission to describe the climate of the United States and act as the **"Nation's Scorekeeper" regarding the trends and anomalies** of weather and climate.

- As part of this responsibility we also analyze extreme weather and climate events in the U.S. that have **great economic and societal impacts** known as **"U.S. Billion-dollar Weather & Climate Disasters"**

- **Such extreme events contribute the majority (>80%) of the damage** from **all recorded** U.S. weather and climate events (NCEI; Munich Re).

  - 1980-2000 …(**~75%** of full distribution)
  - 1980-2010 …(**~80%** of full distribution)
  - 1980-2020 …(**~85%** of full distribution) → **$1.825 trillion** of $2.150 trillion in US costs

U.S. Billion-dollar Weather and Climate Disasters

Outline:

- Context for Measuring Disaster Impact
- **Data Sources / What we are Measuring**
- 2020 U.S. Disasters in Context…
- Disaster Cost Comparison and New Tools

Different Ways to Measure Disaster Impact

Disasters


Tornadoes


Wildfires


Floods


Droughts


Heat waves


Snowstorms/ Blizzards


Geophysical


Hurricanes & Tropical Storms

Impacts

Human Health and Wellbeing

Business

Public Infrastructure

Private Property

Environmental Capital (incl. ecosystem services)

What's the right
- Time scale?
- Space scale?
- Size scale?

Measures

Loss of Life

Mental Health

Physical Health

Quality of Life

GDP

Net Economic

Market

Non-market

To capture losses requires a broad array of **public** and **private** data

	Hurricanes / Tropical Storms	Severe Local Storms	Winter Storms	Crop Freeze	Wildfire	Drought / Heat Wave	Inland / Riverine Flooding
Insurance Service Office - Property Claim Services	x	x	x		x		x
FEMA – Presidential Disaster Declarations	x	x	x	x	x		x
FEMA – National Flood Insurance Program	x						x
USDA – Risk Management Agency	x	x	x	x	x	x	x
National Interagency Fire Center					x		
Energy Information Administration	x	x	x		x	x	
US Army Corps of Engineers							x
State Agencies	x	x	x	x	x	x	x

Account for <u>total, direct losses</u> (i.e., **insured** and **uninsured**) for assets including:

- **physical damage** to residential, commercial, and government buildings
- **material assets** (content) within a building
- **time element losses** (i.e., time costs for businesses; hotel costs for loss of living quarters)
- **vehicles, boats, offshore energy platforms**
- **public infrastructure** (i.e., roads, bridges, buildings)
- **agricultural assets** (i.e., crops, livestock, timber)

We <u>do not</u> account for: natural capital losses; healthcare-related costs; all downstream (indirect) costs

U.S. Billion-dollar Weather and Climate Disasters

Outline:

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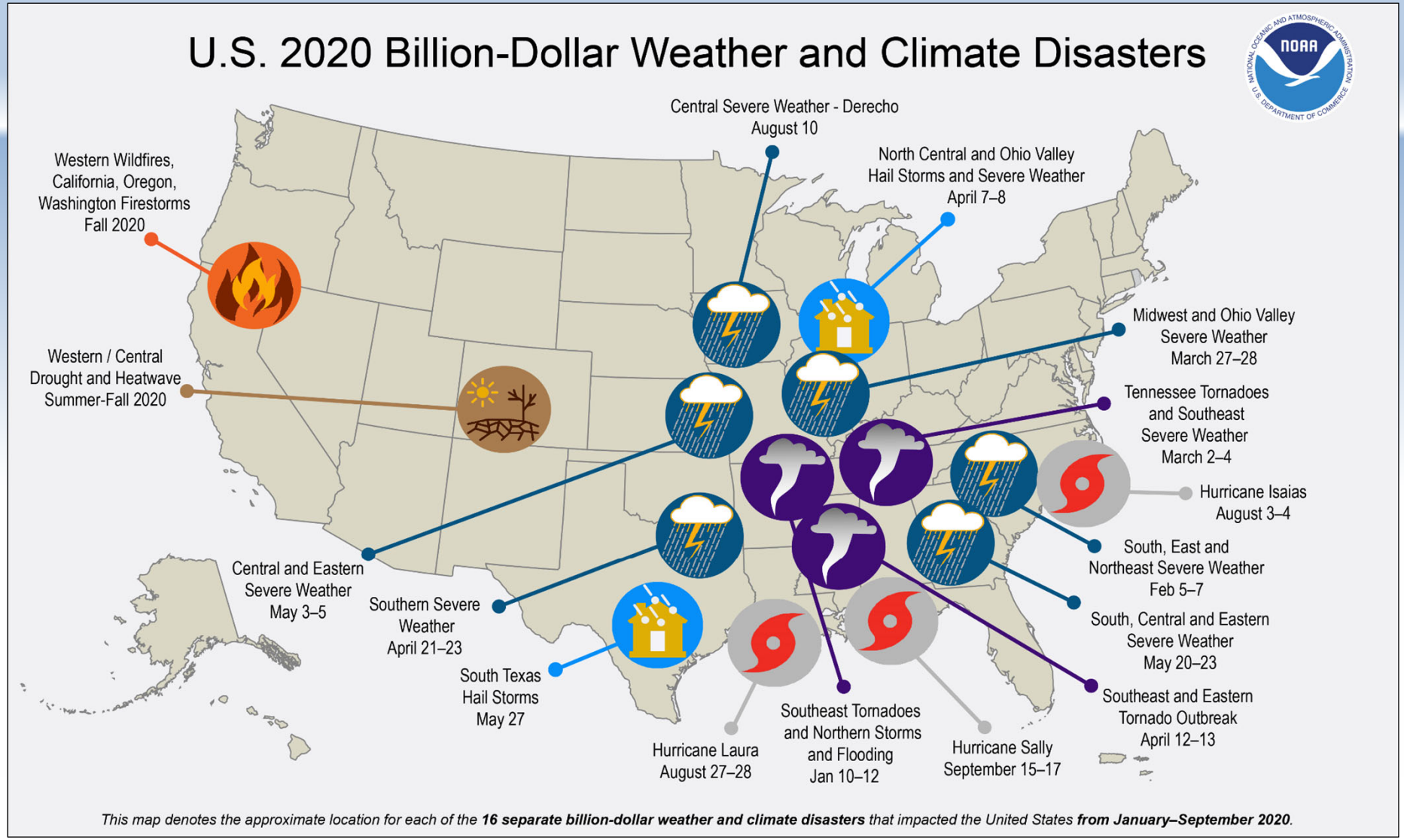
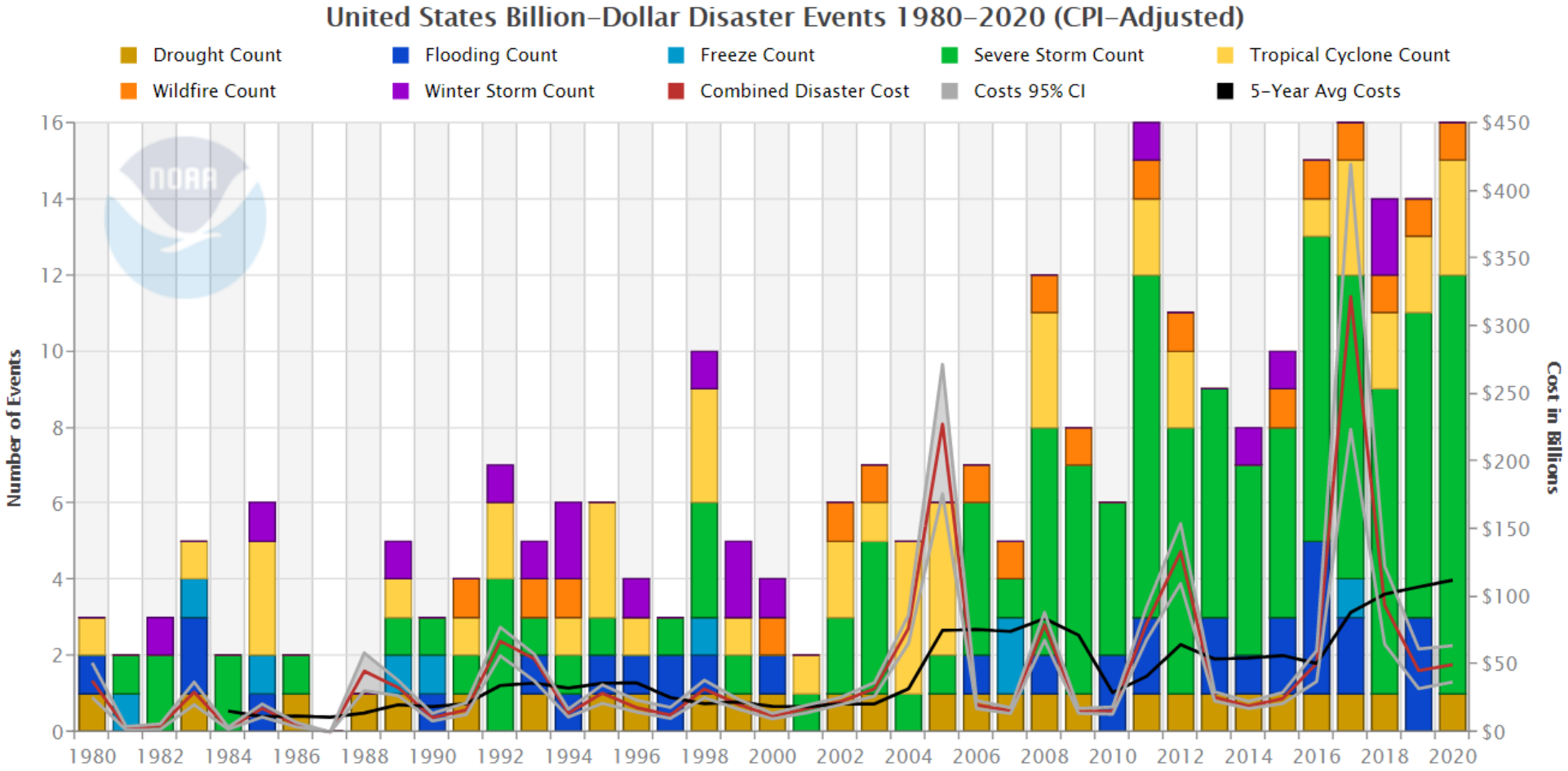
- **2020 U.S. Disasters in Review…**
- Disaster Cost Comparison and New Tools



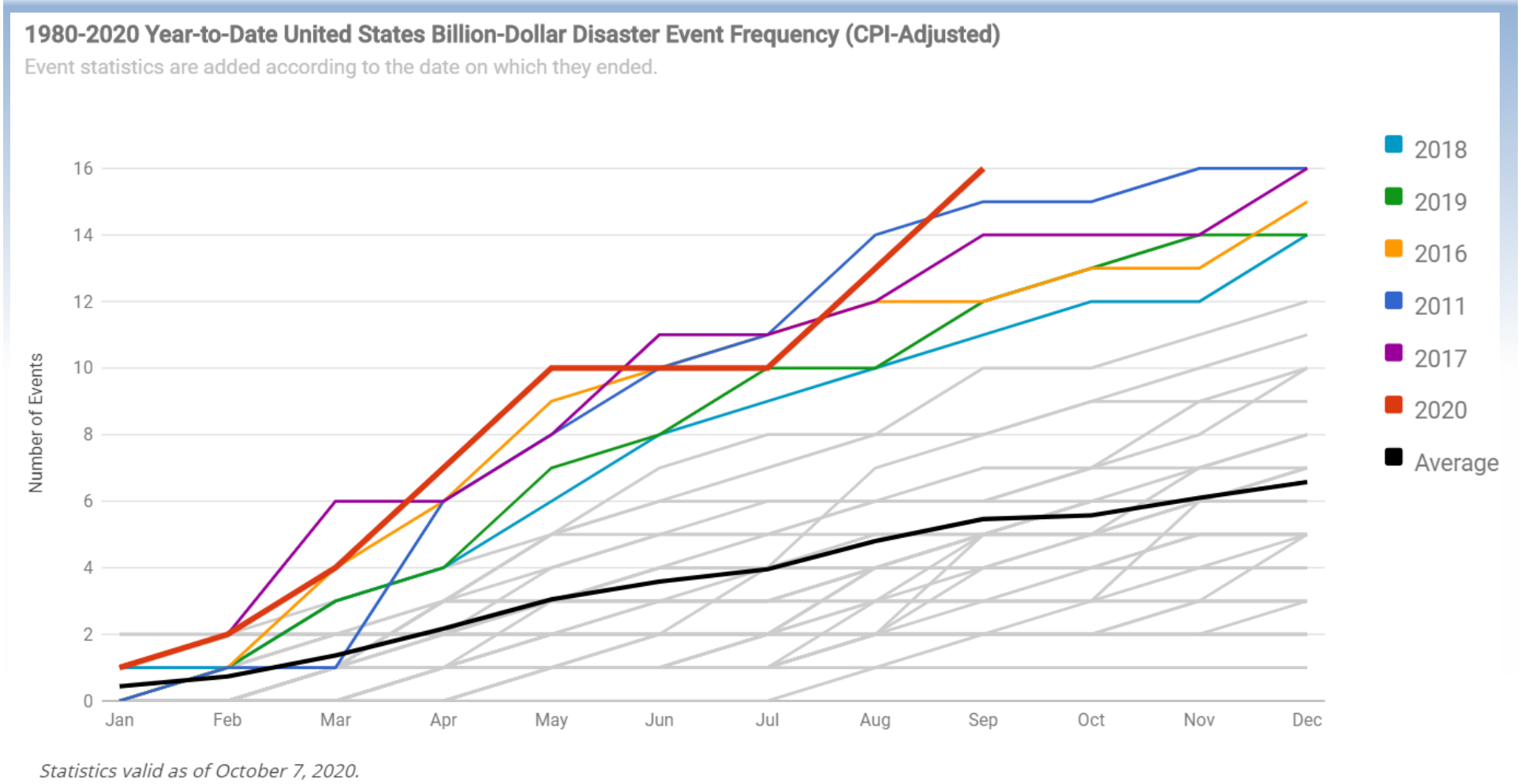
- During the <u>first 9 months</u> of **2020**, the U.S. experienced **16 severe storm events** with impacts from tornadoes, hail and high wind damage, tropical cyclones, drought and wildfires. 2020 ties annual record set in 2011 & 2017
- 2020 is now the fourth consecutive year (2017-2020) that the U.S. has been impacted by a slow moving tropical cyclone that produced extreme rainfall and damaging floods - Harvey, Florence, Imelda and Sally

U.S. Billion-dollar event frequency, annual cost, 5-year cost average (1980–2020)



- **2020:** above average annual costs (>**$50.0 billion**) vs. the CPI-adjusted, 1980-2019 annual average (**$43.9 billion)**
- **2020**: Costs (TBD) for the Western wildfires, Western/Central Drought/Heat Wave and Hurricanes Sally, Delta and Zeta
- 5-year annual cost average **$106.3 billion, a record;** costs over **last 5 years** (2016-2020) >**$550 billion - a record**

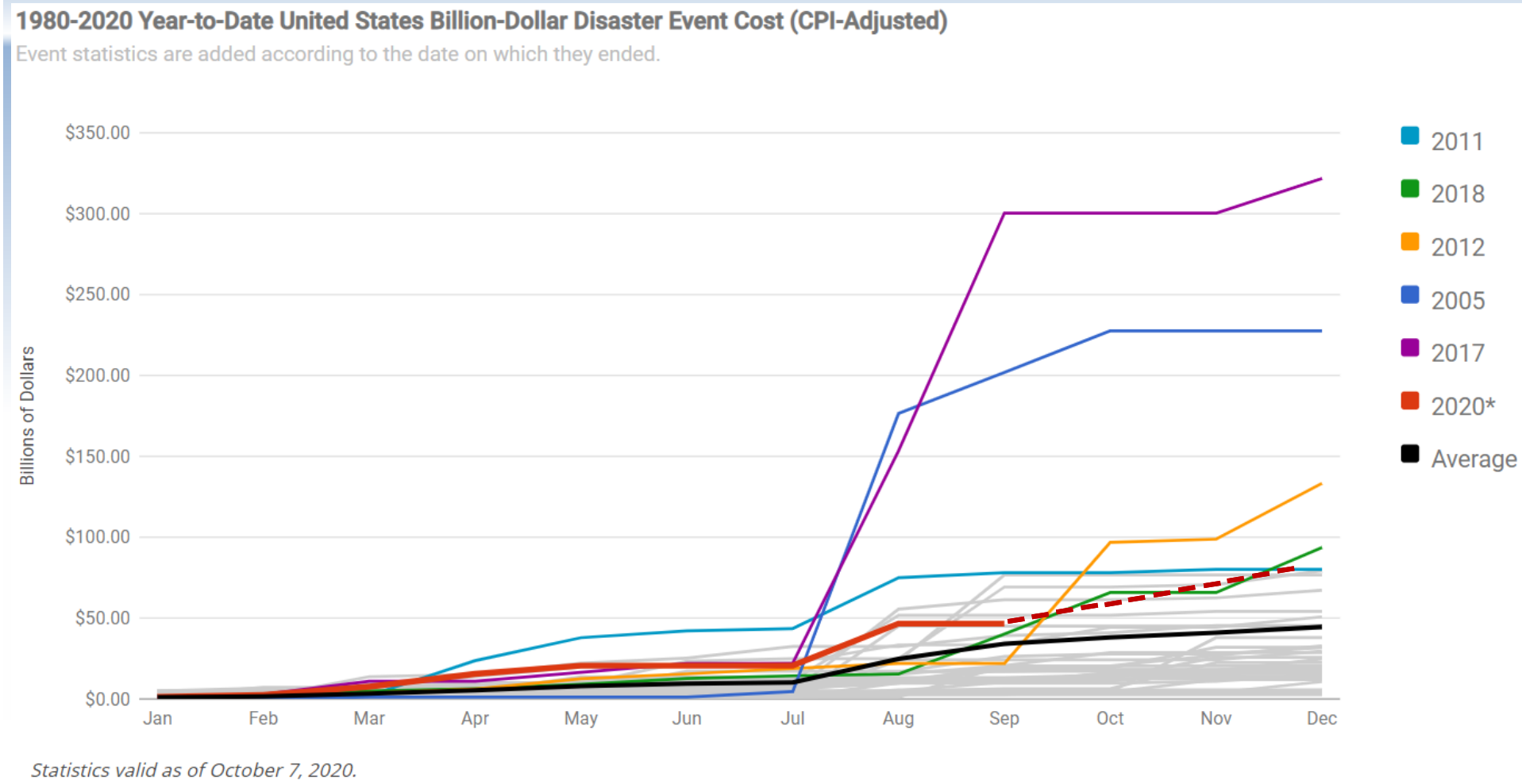
Cumulative U.S. billion-dollar disaster frequency (year-to-date) for years 1980-2020



Statistics valid as of October 7, 2020.

- **Red line shows Jan-Sept 2020 number of billion-dollar disaster events (16) through Sept 30.**
- **1980 – 2019** annual average: **6.5 events** (CPI-adjusted). **2015–2019** annual average: **13.8 events** (CPI-adjusted)

Cumulative U.S. billion-dollar disaster cost (year-to-date) for years 1980-2020



Statistics valid as of October 7, 2020.

- The 2020 costs to date are **>$50 billion in damages**. 2020 is an above-average cost year.
- Hyperactive Atlantic hurricane & western wildfire season ongoing.
- **Most B$D US tropical cyclones on record (5), historic Western wildfires, Midwest derecho, etc.**

U.S. Billion-dollar Weather and Climate Disasters

Outline:

- Context for Measuring Disaster Impact
- Data Sources / What we are Measuring
- 2020 U.S. Disasters in Review…
- **Disaster Cost Comparison and New Tools**

What we find: From Jan**1980**-Sept**2020**, the U.S. has experienced 279 distinct billion-dollar weather & climate events - each causing at least $1 billion in direct losses

- **Total, direct losses** from these **279 events** exceeds **$1.825 trillion** (CPI-adjusted, 2020)

DISASTER TYPE	EVENTS	PERCENT FREQUENCY	TOTAL COSTS	PERCENT OF TOTAL COSTS	COST/EVENT	DEATHS
Drought	28	10.0%	$254.3B‡ CI	13.9%‡	$9.4B‡	3,865†
Flooding	33	11.8%	$151.0B CI	8.3%	$4.6B	617
Freeze	9	3.2%	$30.7B CI	1.7%	$3.4B	162
Severe Storm	126	45.2%	$280.3B CI	15.3%	$2.2B	1,761
Tropical Cyclone	48	17.2%	$974.9B‡ CI	53.4%‡	$20.7B‡	6,570
Wildfire	18	6.5%	$85.7B‡ CI	4.7%‡	$5.0B‡	388
Winter Storm	17	6.1%	$50.0B CI	2.7%	$2.9B	1,048
All Disasters	**279**	**100.0**	**$1,826.9B‡ CI**	**100.0%‡**	**$6.6B‡**	**14,411**

Decadal comparison of U.S. Billion-dollar disaster stats

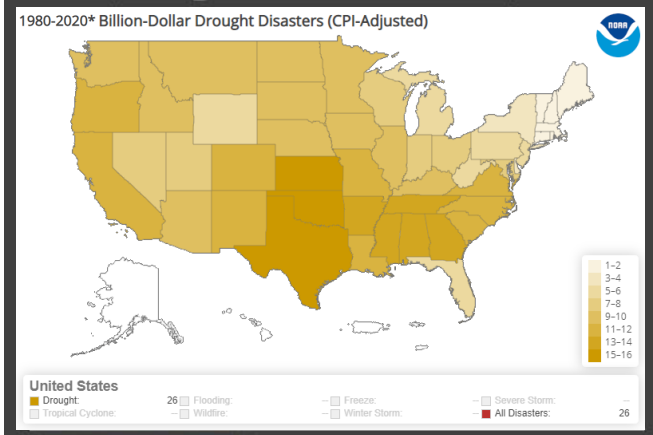
	Number of billion-dollar disasters (average per year)	Associated Costs (average per year)	Associated Fatalities (average per year)
1980s (1980-89)	28 (2.8)	$127.7B ($12.8B)	2,808 (281)
1990s (1990-99)	52 (5.2)	$269.6B ($27.0B)	2,173 (217)
2000s (2000-09)	59 (5.9)	$510.3B ($51.0B)	3,051 (305)
2010s (2010-19)	119 (11.9)	$802.0B ($80.2B)	5,217 (522)
Last 5 years (2015-19)	69 (13.8)	$531.7B ($106.3B)	3,862 (772)
Last 3 years (2017-19)	44 (14.7)	$456.7B ($152.2B)	3,569 (1,190)

The **number and cost of disasters are increasing over time** due to a **combination of** increased exposure (i.e., values at risk of possible loss), vulnerability (i.e., where we build; how we build) and that climate change is increasing the frequency of some types of extremes that lead to billion-dollar disasters (NCA 2018, Chapter 2)

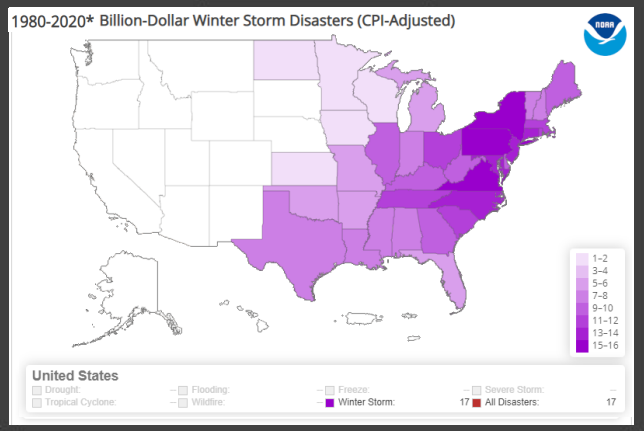
The Nation is weather and climate conscious…for good reason,
as each geographic region faces unique hazards

Billion-dollar weather and climate disasters frequency mapping: Jan1980-Sept2020

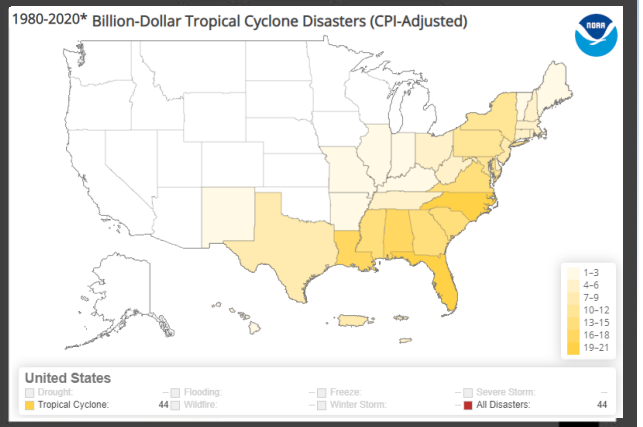
Droughts and Heat Waves



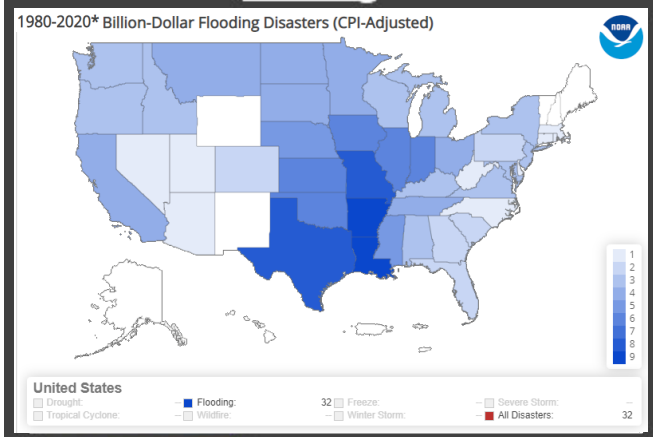
Winter Storms



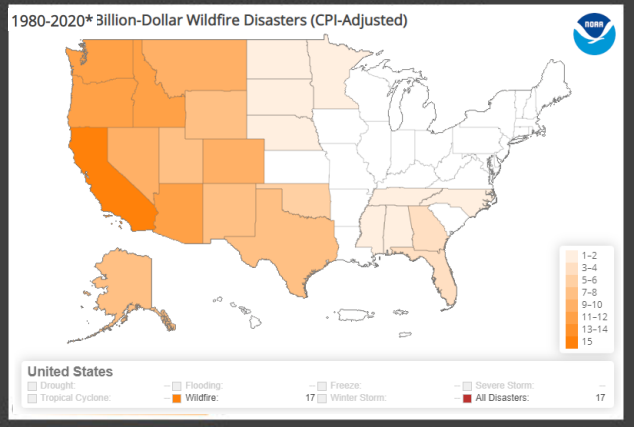
Tropical Cyclones



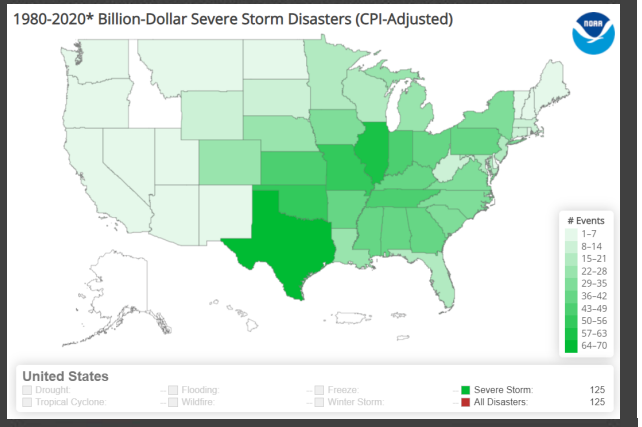
Flooding



Wildfires



Severe Local Storms

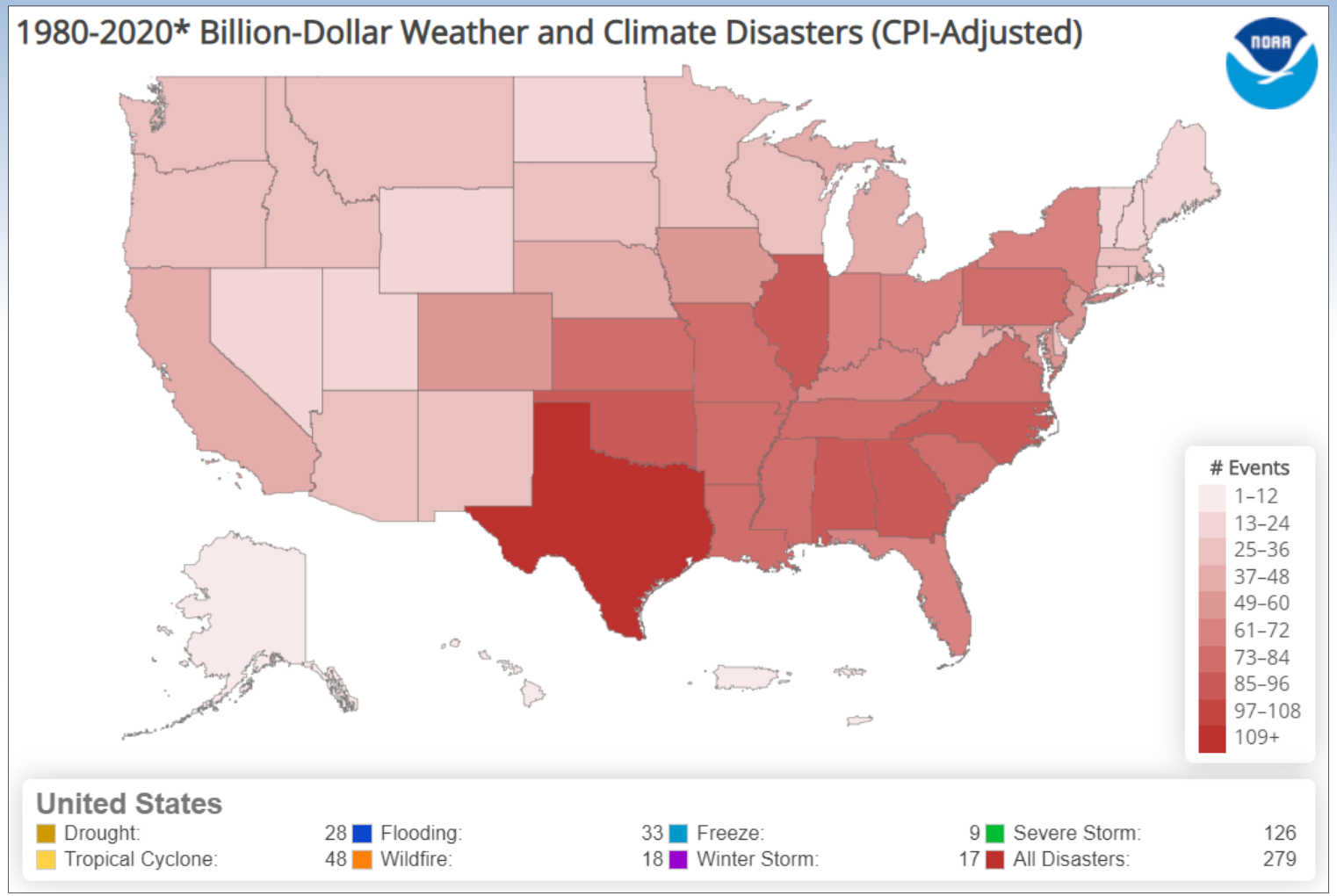


***279** weather and climate disasters reached or exceeded $1 billion during this period (CPI-adjusted); cost > **$1.825 trillion in damages**

Please note that the map reflects a summation of billion-dollar events for each state affected (i.e., it does not mean that each state shown suffered at least $1 billion in losses for each event).

From 1980–2020, the U.S. **South, Central** and **Southeast** regions experienced a higher frequency of billion-dollar disaster events than any other region

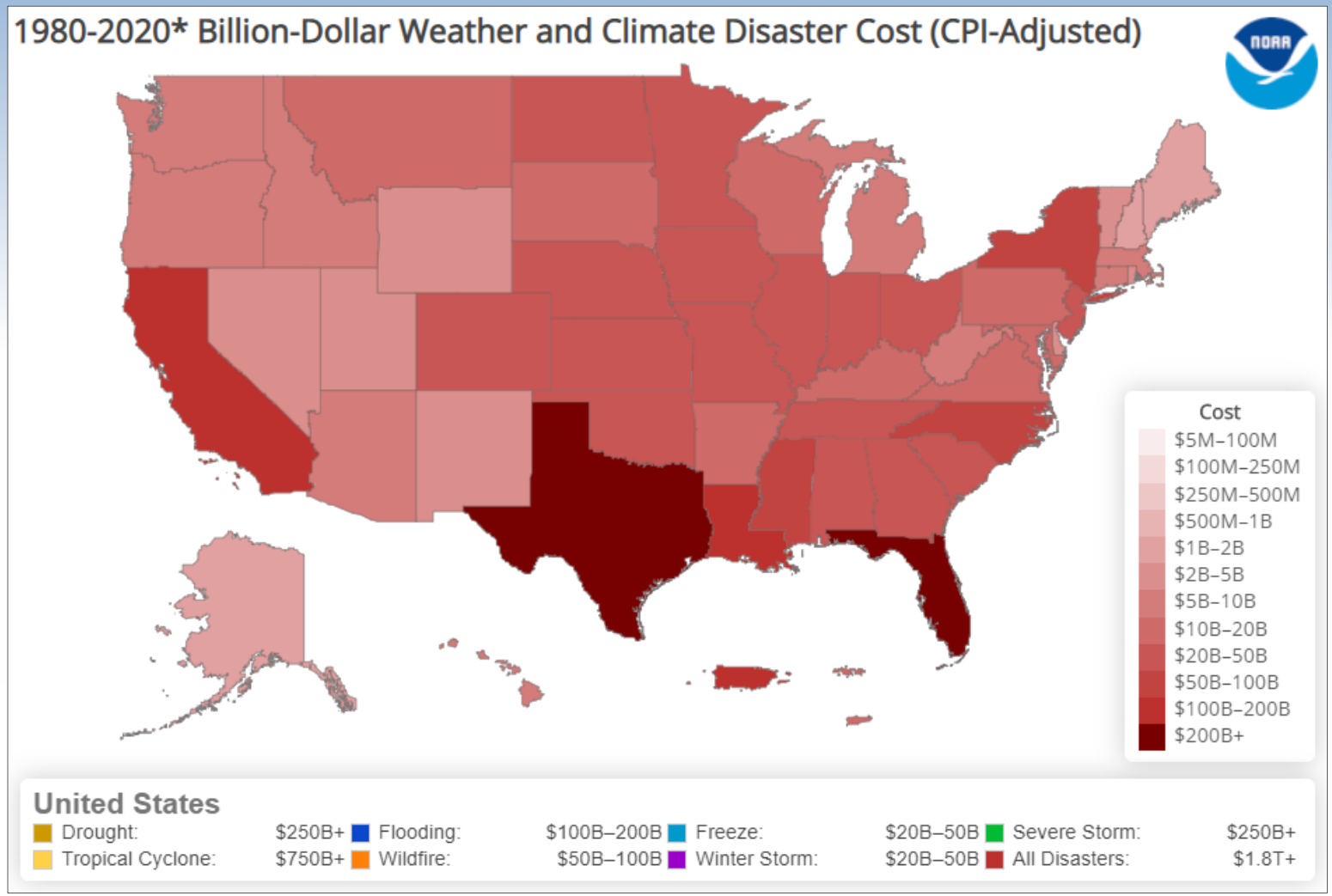
Cumulative Event Frequency (1980-2020) for each state (combined perils)



→ Reflects the **frequency, diversity,** & **severity** of weather & climate events impacting the regions

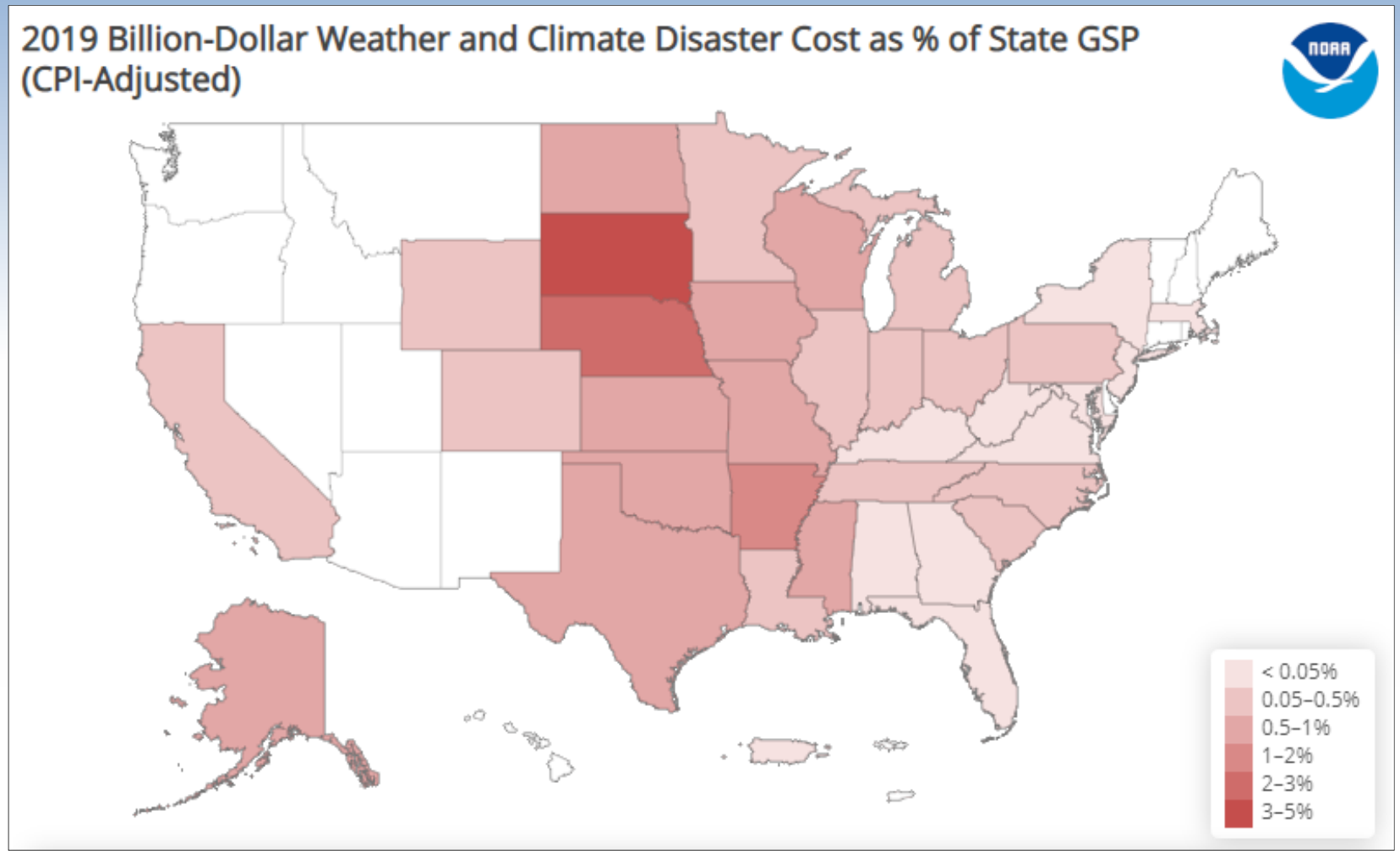
From 1980–2020, the U.S. **South, Central** and **Southeast** regions experienced a higher cost from billion-dollar disaster events. CA, NY, NJ, PR and V.I. as well.

Cumulative Event Cost (1980-2020) for each state (combined perils)

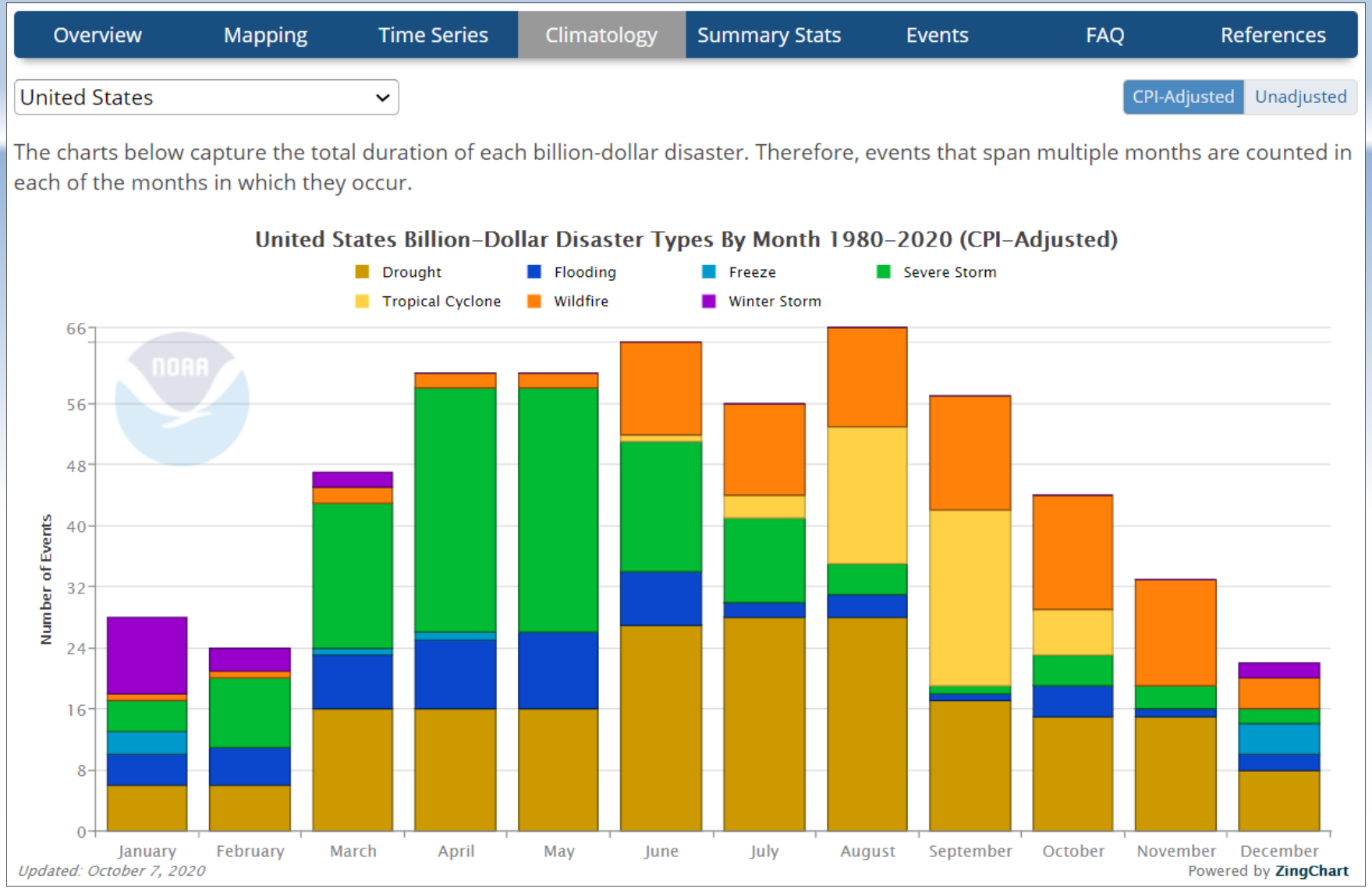


→ Reflects the **severity** & **vulnerability** of weather & climate events impacting different regions

Comparing the 2019 disaster costs for each state as a % of that state's 2019 GSP (economic output)… clear impact from billion-dollar disaster events

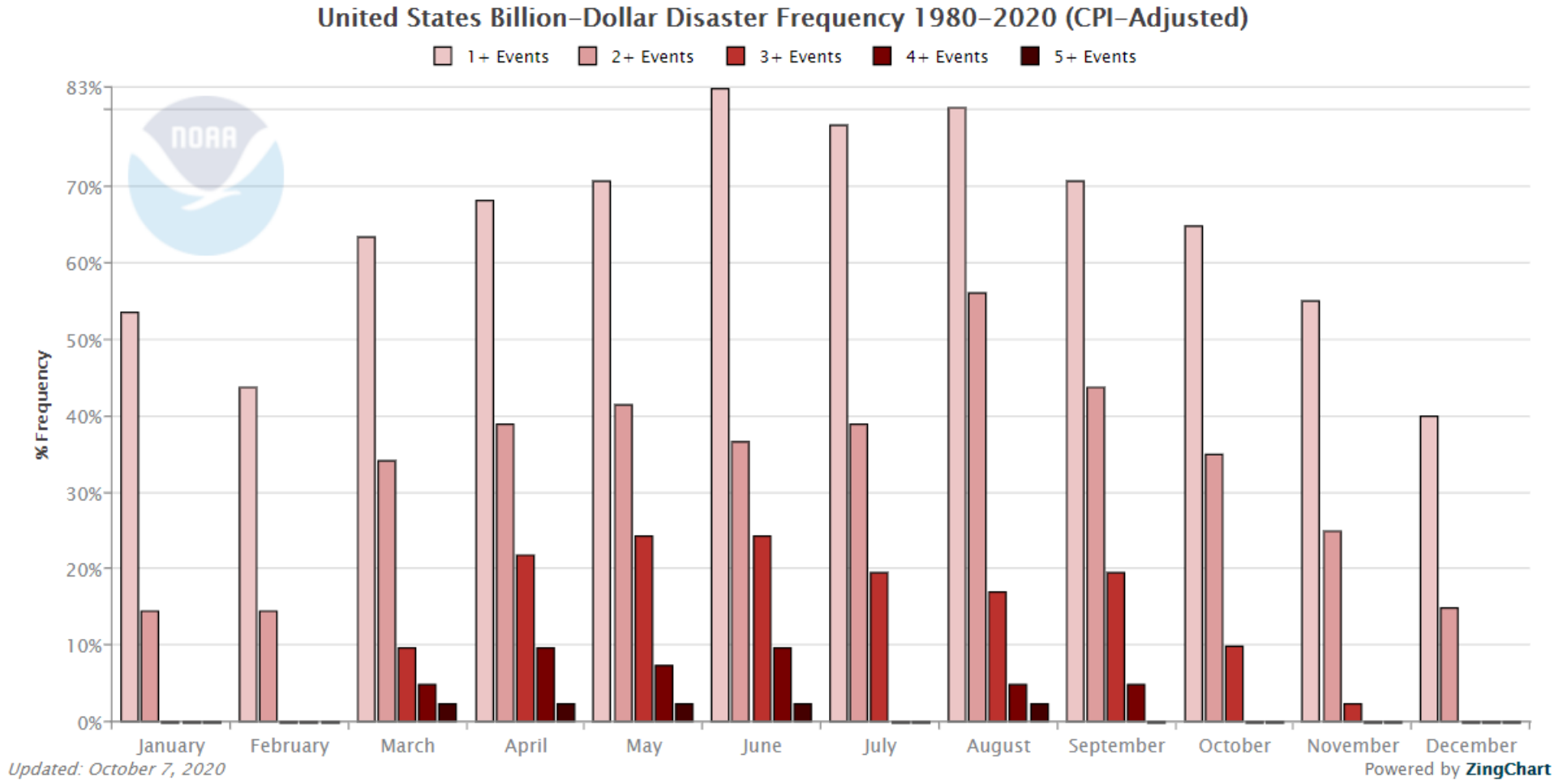


→ Reflects the **severity** & **vulnerability** of weather & climate events vs. scale of economy



- A chart to visualize the 40+ year climatological frequency of extreme, damaging events across the Nation.
- A way for decision-makers to utilize historical data to understand which types of large events typically occur at what times of year, by region.

Raises awareness of the potential for multiple, cascading hazards, which historically can occur from season to season.

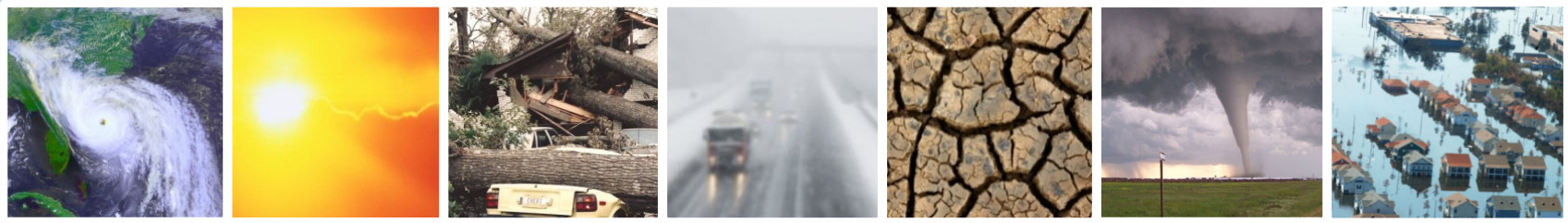


As noted in the *Climate Science Special Report* of the *Fourth National Climate Assessment*, "The physical and socioeconomic impacts of compound extreme events (such as simultaneous heat and drought, wildfires associated with hot and dry conditions, or flooding associated with high precipitation on top of snow or waterlogged ground) can be greater than the sum of the parts."

For interactive data, charts, mapping and disaster summaries, see:

www.ncdc.noaa.gov/billions

See new article: **2010-2019: A landmark decade of U.S. billion-dollar weather and climate disasters**
www.climate.gov/news-features/blogs/beyond-data/2010-2019-landmark-decade-us-billion-dollar-weather-and-climate



Adam.Smith@noaa.gov

For more detail on data, methodology and uncertainty, see:

- Smith A.B. and J.M. Matthews, 2015: Quantifying Uncertainty and Variable Sensitivity within the U.S. Billion-dollar Weather and Climate Disaster Cost Estimates. *Natural Hazards*, 77, 1829-1851 (https://www.ncdc.noaa.gov/billions/docs/smith-and-matthews-2015.pdf)

- Smith, A.B. and R.W. Katz, 2013: U.S. Billion-dollar weather and climate disasters: Data sources, trends, accuracy and biases. *Natural Hazards*, 67, 387–410 (https://www.ncdc.noaa.gov/billions/docs/smith-and-katz-2013.pdf)

ALFREDO GOMEZ

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Limiting the Federal Government's Fiscal Exposure By Better Managing Climate Change Risks

December 16, 2020

Federal Accounting Standards Advisory Board

Climate Education Session

Alfredo Gomez, Director

Natural Resources and Environment Team

U.S. Government Accountability Office

About GAO

- GAO is an independent, nonpartisan agency that works for the U.S. Congress.
- Often called the "congressional watchdog," GAO investigates how the federal government spends taxpayer dollars.
- GAO's work is primarily done at the request of congressional committees or is mandated by public laws or committee reports.

GAO's Natural Resources and Environment Team

- The Natural Resources and Environment (NRE) team is responsible for GAO's assessments of federal efforts to:
  - manage our nation's land and water resources,
  - protect the environment,
  - ensure food safety,
  - manage agricultural programs,
  - ensure a reliable and environmentally sound energy supply,
  - limit federal fiscal exposure to climate change, and
  - address US and international nuclear security and cleanup.

Added to High Risk List in 2013

Limiting the Federal Government's Fiscal Exposure by Better Managing Climate Change Risks

To reduce its fiscal exposure, the federal government needs a cohesive strategic approach with strong leadership and the authority to manage risks across the entire range of related federal activities.

Why Area Is High Risk

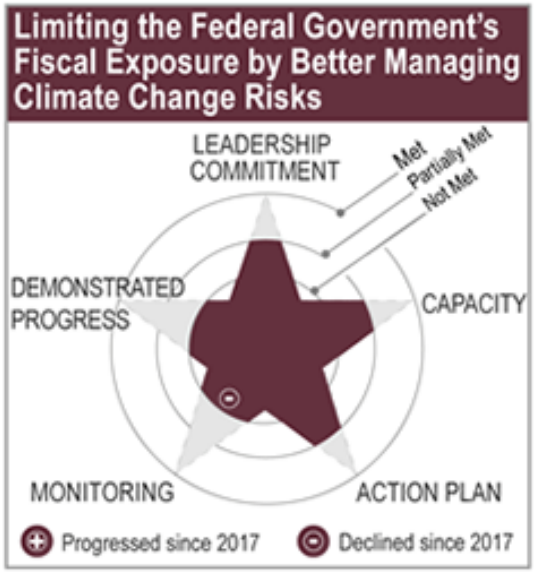
Numerous studies have concluded that climate change poses risks to many environmental and economic systems and creates a significant fiscal risk to the federal government. For example, according to the November 2018

Limiting the Federal Government's Fiscal Exposure by Better Managing Climate Change Risks

The rising number of natural disasters and increasing reliance on federal assistance is a key source of federal fiscal exposure. Since 2005, federal funding for disaster assistance is approaching

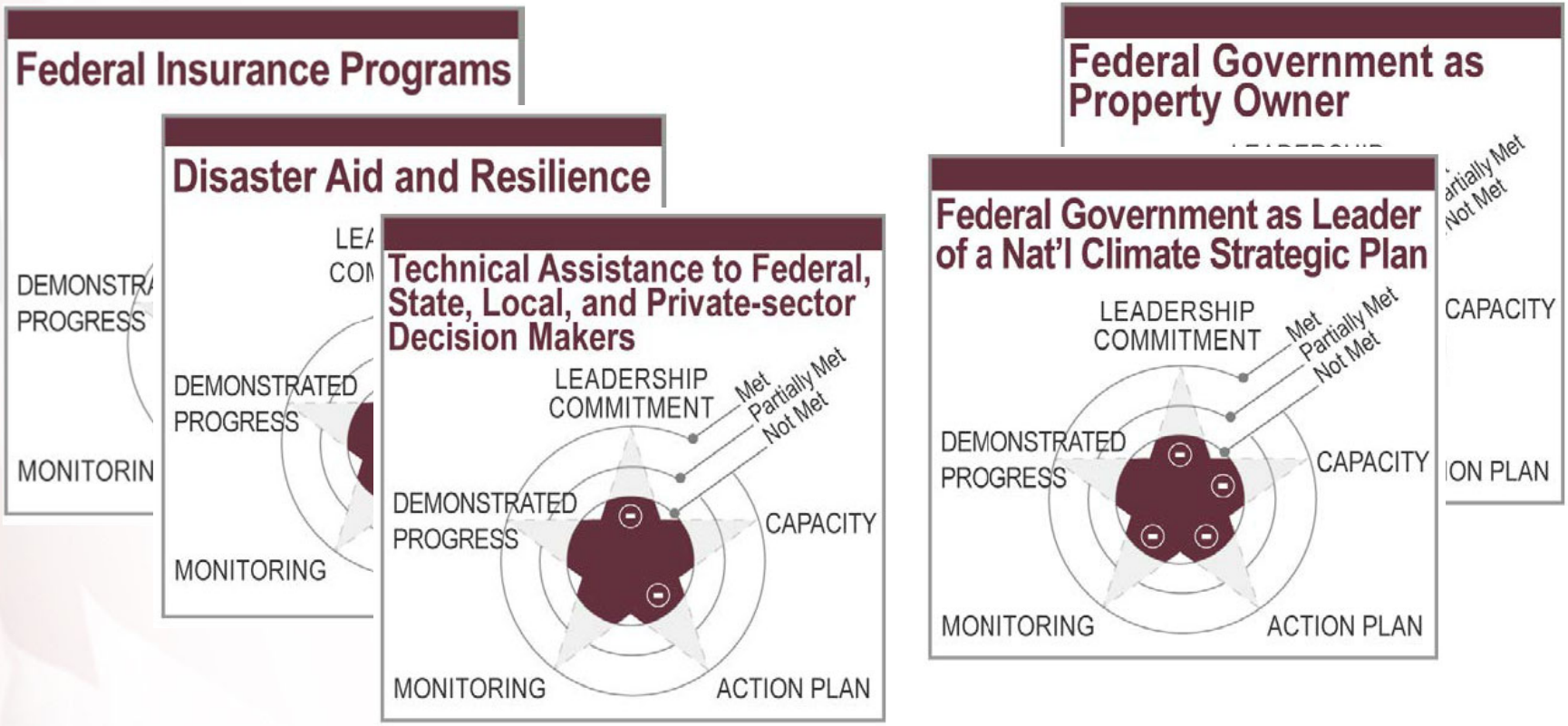
Limiting the Federal Government's Fiscal Exposure By Better Managing Climate Change Risks

- Leader of a strategic plan
- Owner and operator of infrastructure
- Insurer of property and crops
- Provider of technical assistance to decision makers
- Provider of disaster assistance



Source: GAO analysis. | GAO-19-157SP

GAO's High Risk Series: Limiting the Federal Government's Fiscal Exposure by Better Managing Climate Change Risks



Next Update: February 2021

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GAO's Climate Change Adaptation Work

December 16, 2020

Federal Accounting Standards Advisory Board

Climate Education Session

Joe Thompson, Assistant Director

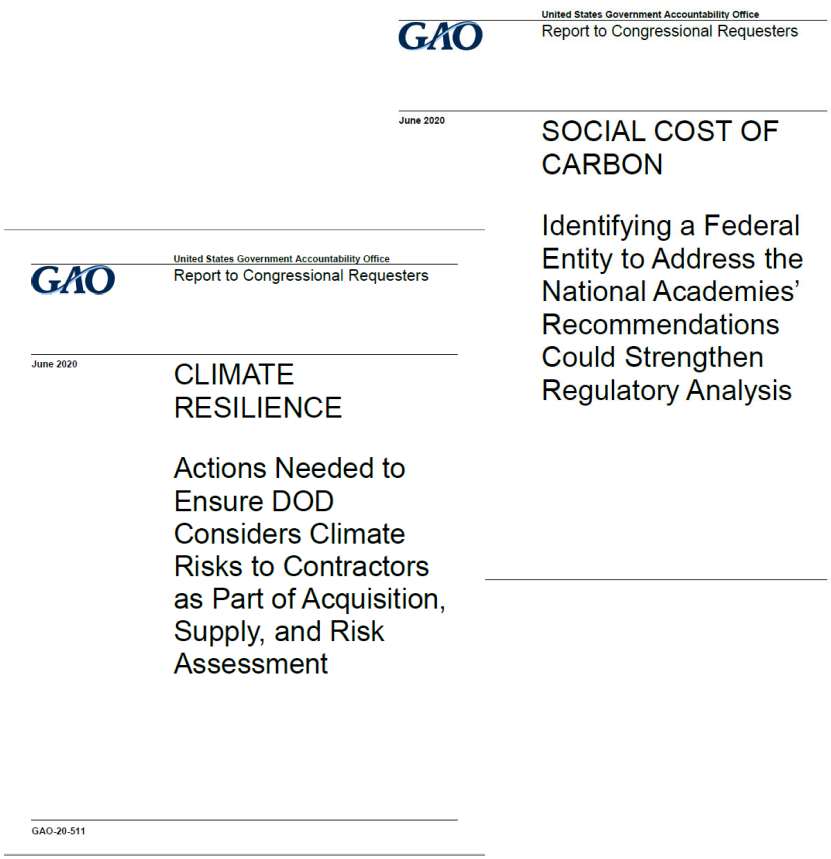
Natural Resources and Environment Team

U.S. Government Accountability Office

10 reports released in the past year and many more underway

Topics Include

- Federal infrastructure, including DOD
- Natural Disasters
- Economic Costs & Opportunities
- Agriculture
- Domestic & Global migration
- Tribal Issues
- Nuclear Waste
- Superfund, Chemical Facilities, & RCRA



Two Types of Climate Adaptation Reports

Mainstreaming

(Building Forward-Looking Climate Risk into Existing Programs)

- Superfund sites
- Design Standards and Building Codes
- Water systems

New Institutions

- National Climate Information System
- Identify (and fund) high-priority adaptation projects
- Climate migration pilot program

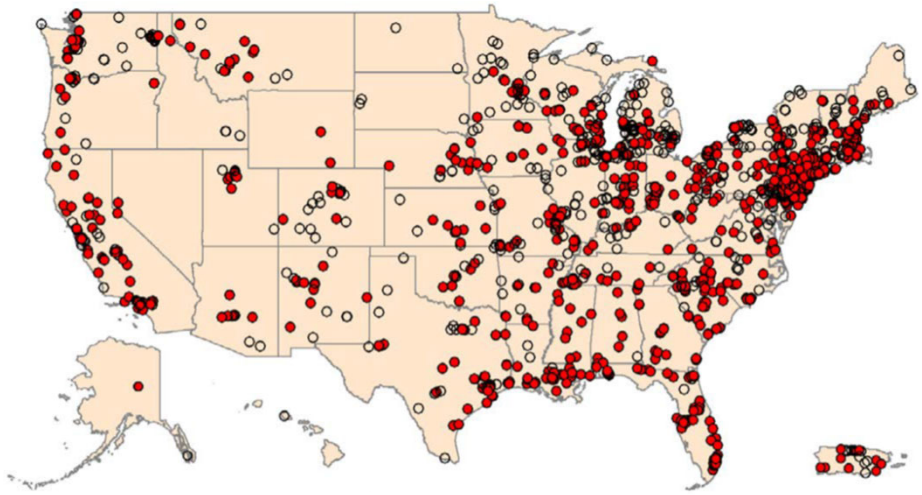
Mainstreaming Example 1: EPA's Superfund Program

We found:

- About 60% of Superfund sites overseen by EPA are in areas that may be impacted by wildfires and different types of flooding—natural hazards that may be exacerbated by climate change.

We recommended:

- EPA provide direction on integrating climate information into site-level decision making to ensure long-term protection of human health and the environment.



Superfund Sites Located in Areas that May Be Impacted by Flooding, Storm Surge, Wildfires, or Sea Level Rise

Superfund: EPA Should Take Additional Actions to Manage Risks from Climate Change (GAO-20-73)

Mainstreaming Example 2: Climate Information for Design Standards and Building Codes

- *Improved Federal Coordination Could Facilitate Use of Forward-Looking Climate Information in Design Standards, Building Codes, and Certifications (GAO-17-3)*
- *Design standards and building codes generally use historical climate observations.*

"Continuing to build with current standards and codes could cost the federal government billions of dollars in repairs, flood insurance, and disaster relief."

Source: GAO. | www.gao.gov

Design Standards and Building Codes—Data & Information Used

- Reviewed reports and documents from the 17 standards-developing organizations and experts.
- Standards-developing organizations:
  - develop design standards, building codes, and certifications
  - Covered four infrastructure sectors—energy, government facilities, transportation, and water and wastewater systems.
- Challenges: Standards setting organizations face institutional and technical challenges to using the best available forward-looking climate information.
- Recommendation: NIST convene federal agencies to provide the best available forward-looking climate information to standards-developing organizations

Mainstreaming Example 3 : Water Infrastructure

Relocation of Iowa City's North Wastewater Treatment Facility Because of 2008 Flooding

We found:

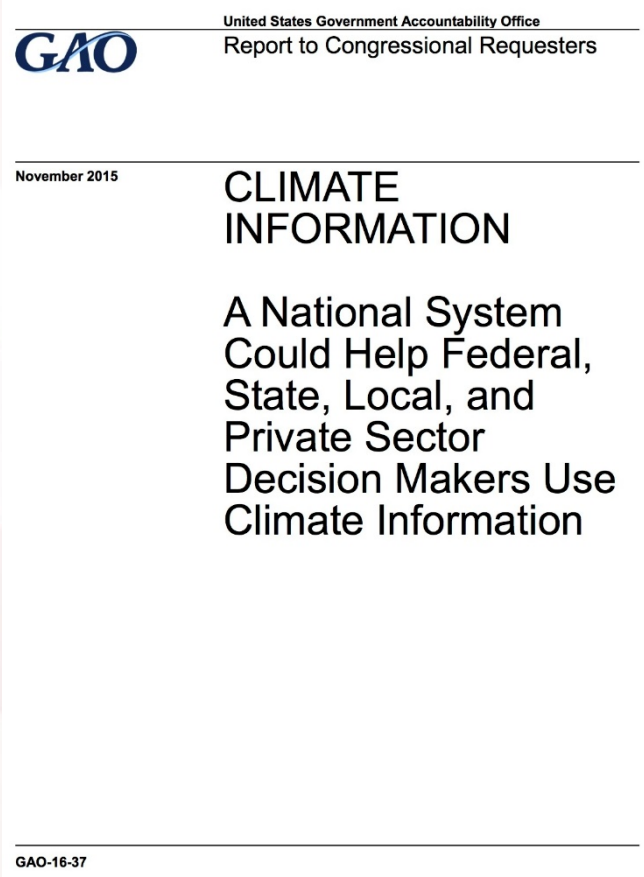
- Utilities need additional technical assistance on an ongoing basis to manage climate risks
- Agencies don't consistently consider climate resilience when funding water infrastructure projects

We recommended:

- Congress should consider requiring that climate resilience be considered in planning for federally funded water infrastructure projects
- EPA identify technical assistance providers and engage them in a network to help water utilities incorporate climate resilience into infrastructure projects

Water Infrastructure: Technical Assistance and Climate Resilience Planning Could Help Utilities Prepare for Potential Climate Change Impacts (GAO-20-24)

New Institutions Example 1: National Climate Information System


United States Government Accountability Office

Report to Congressional Requesters

November 2015

CLIMATE INFORMATION

A National System Could Help Federal, State, Local, and Private Sector Decision Makers Use Climate Information

GAO-16-37

- User needs not met in many sectors/regions/scales/purposes
- Many federal efforts underway, but fragmented across agencies that use information in different ways to meet their missions.
- Federal, state, local and other decision makers may be unaware that these data exist or unable to use what is available.
- Need to develop best available authoritative climate information for decision-making, and providing technical assistance to help decision makers use it.

National Climate Information System—Data & Information

- Identified and reviewed over 60 relevant reports and studies from 2000 to 2014 including peer reviewed journals, trade and industry journals, government reports, and publications from research organizations.
- Interviewed nonprobability sample of over 40 U.S. stakeholders, including current and former federal officials, local decision makers, researchers, and consultants.
- Visited nonprobability sample of three countries with systems to coordinate the development, archiving, and use of climate information by decision makers—Germany, the Netherlands, and the United Kingdom.
- Challenges: Understanding the governing structures of the information systems in these countries and how we can apply the lessons to the US governing structures.

Key Findings

- Based on our review of climate information systems in other countries and interviews with experts, we found that a national climate information system could be implemented that had roles for federal and nonfederal partners.
- Key federal role would be to provide authoritative data and guidelines for how to use the data.
- Non-federal actors would be better positioned to provide on-the-ground technical assistance.

Climate Information Recommendations

We recommended that the Executive Office of the President should

1. designate a federal agency to develop and periodically update a set of authoritative climate change observations and projections for use in federal decision making, which state, local, and private sector decision makers could also access to obtain the best available climate information, and

2. designate a federal agency to create a national climate information system with defined roles for federal agencies and nonfederal entities

New Institutions Example 2: Prioritizing Resilience Projects

We found:

- Very little ad hoc investment in climate resilience
- No federal action to improve climate risk management
- 6 key steps provide an opportunity for the federal government to strategically identify and prioritize climate resilience projects

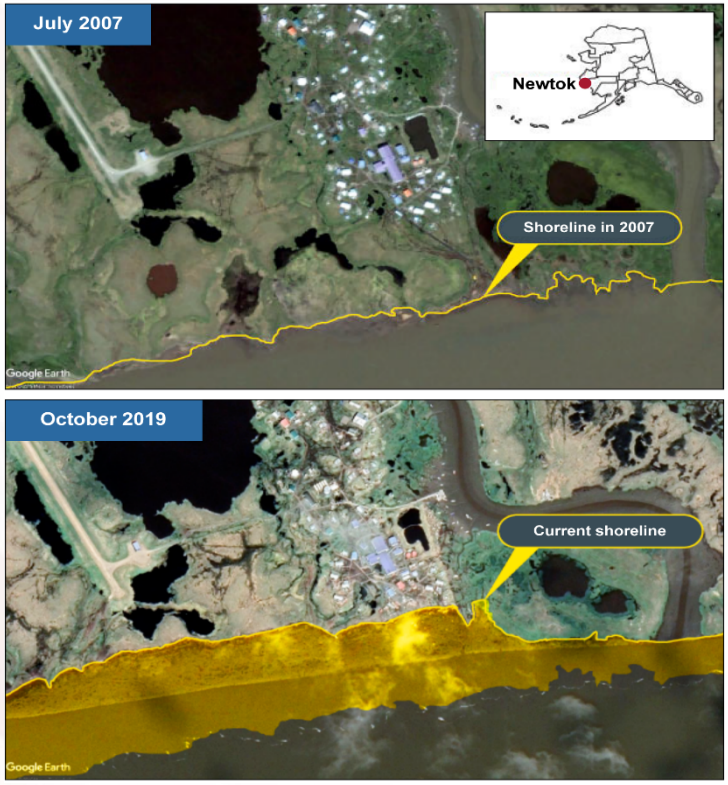
We recommended:

- Congress consider establishing a federal entity to identify and prioritize these projects.

Infrastructure projects, like this system of levees and other barriers in New Orleans, could reduce risk from coastal storms and flooding—events that could be exacerbated by climate change.

Climate Resilience: A Strategic Investment Approach for High-Priority Projects Could Help Target Federal Resources (GAO-20-127)

New Institutions Example 3: Domestic Climate Migration



Shoreline erosion at Newtok, AK, July 2007 to October 2019

Methodology:

- Literature review.
- Interviews with experts and federal, state and local stakeholders.
- Case studies: Newtok, AK; Isle de Jean Charles, LA; Smith Island, MD; Santa Rosa, CA.

We found:

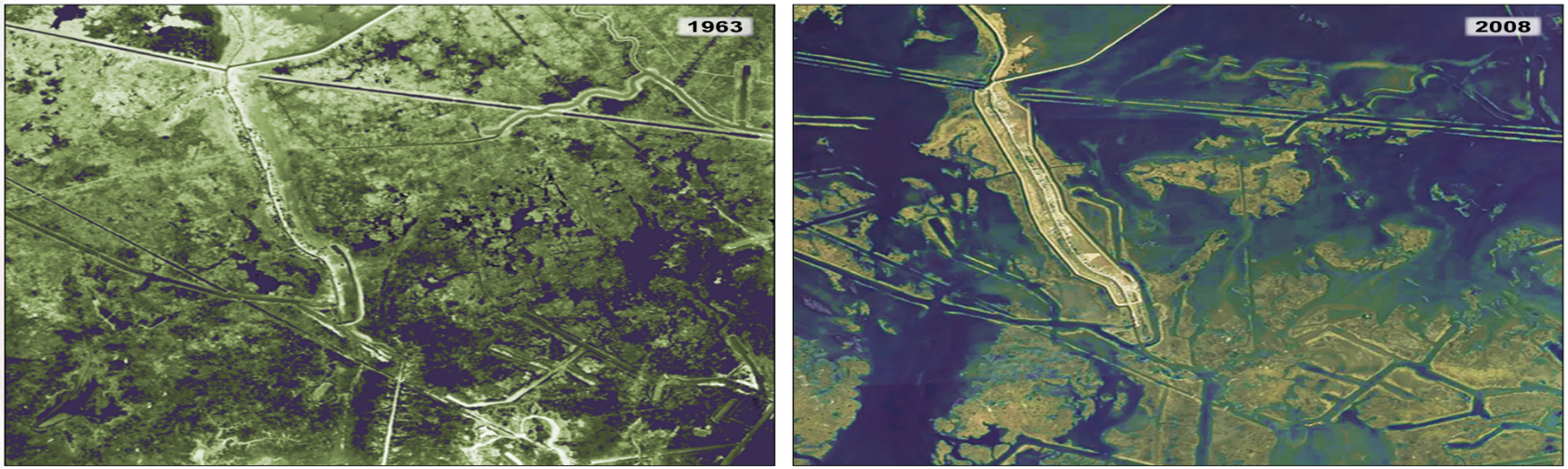
- Federal programs provide limited support to climate migration efforts.
- No federal agency has the authority to lead federal assistance for relocating communities.
- Lack of federal coordination has contributed to delays in Newtok and Isle de Jean Charles.

Climate Change: A Climate Migration Pilot Program Could Enhance the Nation's Resilience and Reduce Federal Fiscal Exposure (GAO-20-488)

Domestic Climate Migration

We recommended:

Congress should consider establishing a pilot program with clear federal leadership to identify and provide assistance to communities that express affirmative interest in relocation as a resilience strategy.



Source: U.S. Geological Society. | GAO-20-488

Isle de Jean Charles Land Loss, 1963 to 2008

Climate Change: A Climate Migration Pilot Program Could Enhance the Nation's Resilience and Reduce Federal Fiscal Exposure (GAO-20-488)

Domestic Climate Migration

Source: G. Crutsinger, Scholar Farms. | GAO-20-488

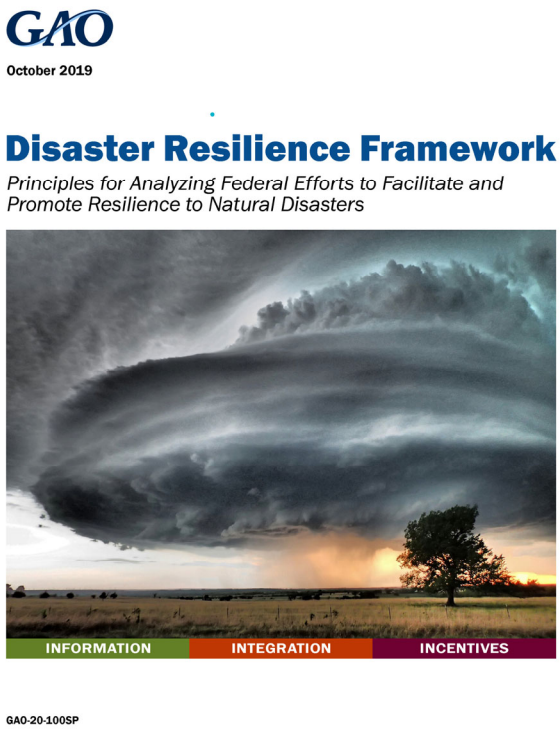
Coffey Park Neighborhood, Santa Rosa, after the October 2017 Wildfire and in April 2019

Factors to consider when creating a pilot program:

- Promote community led planning.
- Address limited community capacity and access to funding.
- Promote coordination across all relevant levels of government.
- Emphasize public service delivery in receiving and migrating communities.

Climate Change: A Climate Migration Pilot Program Could Enhance the Nation's Resilience and Reduce Federal Fiscal Exposure (GAO-20-488)

Disaster Resilience Framework



- Framework organized around 3 principles—information, integration, and incentives—and a series of questions.
- Framework principles can help:
  - Officials that manage federal agencies/programs consider actions they might take to increase resilience to natural hazards.
  - Identify gaps in existing federal efforts or analyze any type of existing federal effort.

Disaster Resilience Framework: Principles for Analyzing Federal Efforts to Facilitate and Promote Resilience to Natural Disasters (GAO-20-100SP)

The Three I's

Information:

- Accessing information that is authoritative and understandable can help decision makers to identify current and future risk and the impact of risk-reduction strategies.

Integration:

- Integrated analysis and planning can help decision makers take coherent and coordinated resilience actions.

Incentives:

- Incentives can help to make long-term, forward-looking risk-reduction investments more viable and attractive among competing priorities.

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Site/Facility CPL Scope

Thermal	Construction	Water
• Cool Inside • Cool Outside • Extremes • Passive Survivability	• Durability • Below grade • Above grade • Enclosure detailing	• Conserve • Drainage • Flooding

Credit: Innovate UK, Bill Gething RIBA, UWE Bristol


Thank you!


Any
Questions