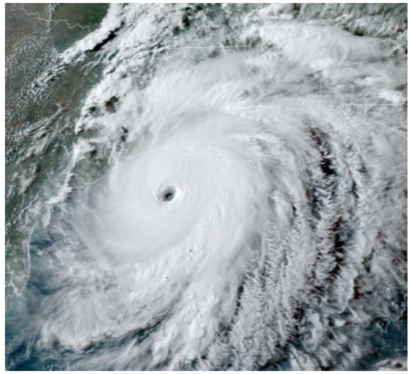
2021 U.S. Billion-dollar Weather and Climate Disasters, Storm Events Data, Multi-Hazard and Socioeconomic Risk Mapping



Better understanding disaster costs, hazard risk and resilience over space and time – integrating U.S. county socioeconomic risk mapping

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NOAA National Centers for Environmental Information (NCEI)
Climate Science and Services Division

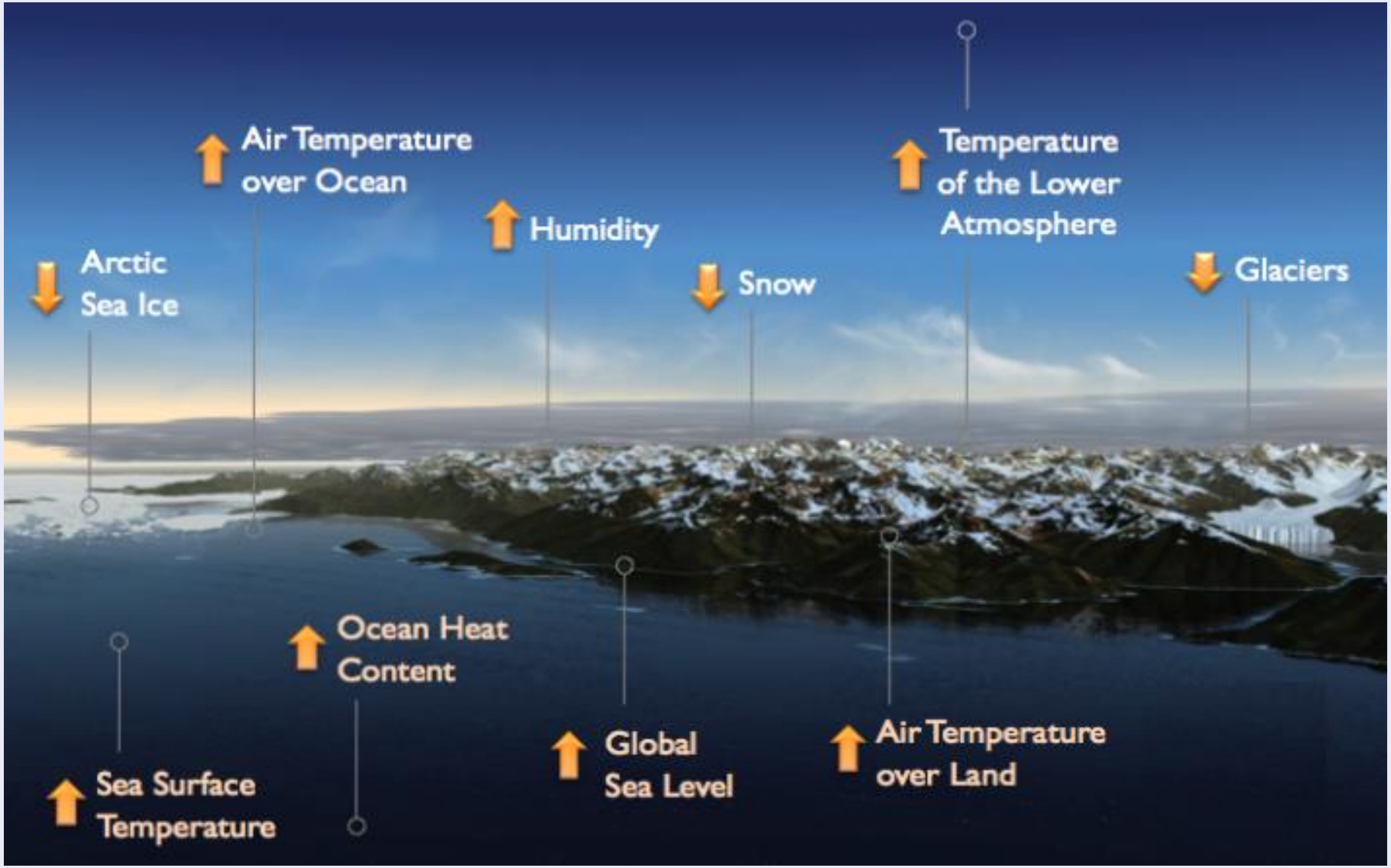
August 2022

U.S Billion-dollar Weather and Climate Disasters

Outline:

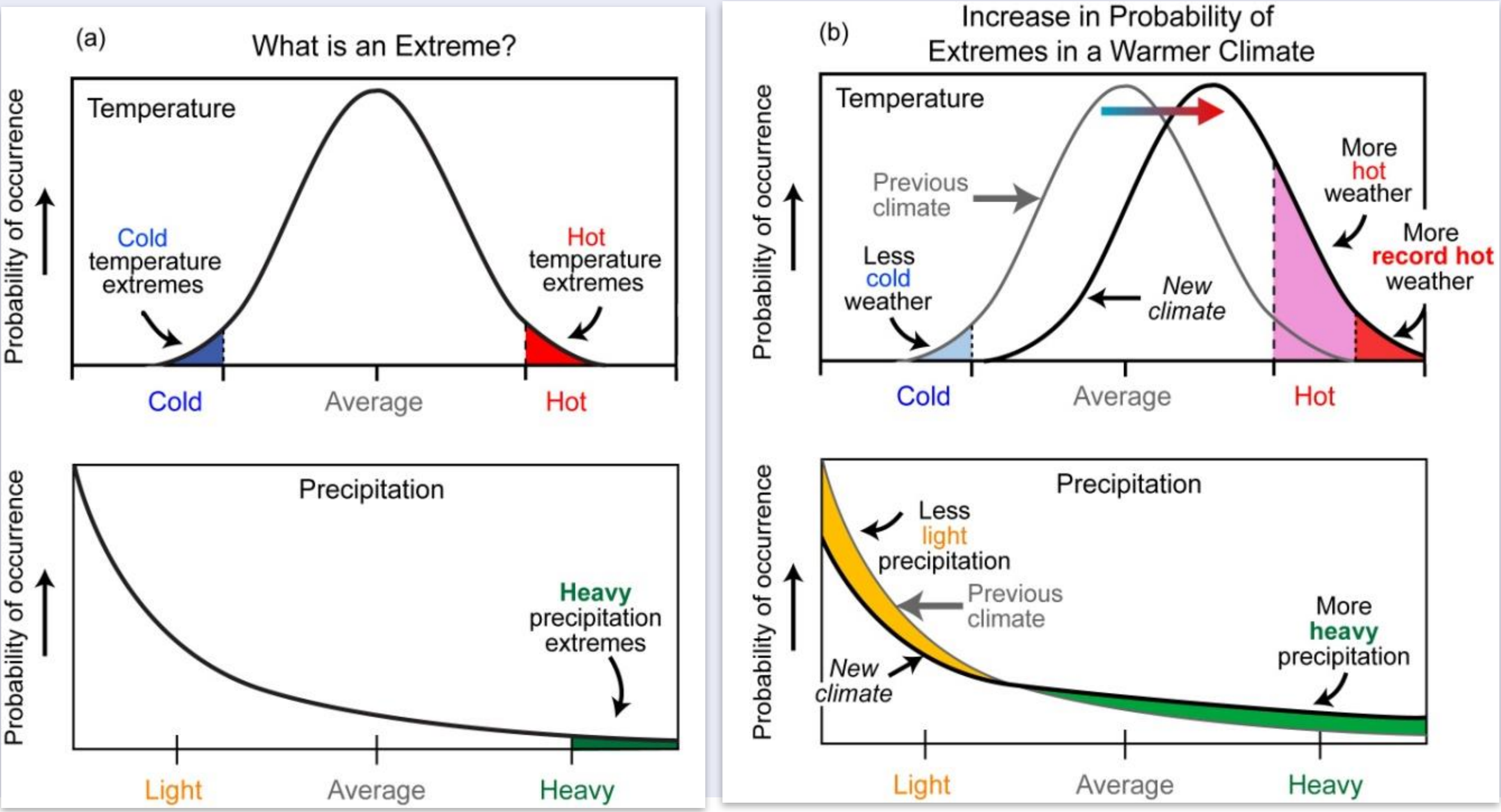
- Context for Measuring Disaster Impact
- Data Sources / What we are Measuring
- 2021 U.S. Disasters in Historical Context
- Hazard Data Comparisons, Maps, Tools
- County / Census tract Multi-hazard Risk Mapping

Changing Climate Conditions Contribute to Extremes



A Future with more Extreme Events

An ‘extreme event’ is a time and place in which weather, climate or environmental conditions — such as temperature, precipitation, prolonged drought, or coastal flooding — rank among the highest or lowest 10% of historical measurements.



NCEI products span from local to global, and weekly to decadal scales

	Daily/Weekly	Monthly	Seasonal – Annual	Annual to Decadal
Local	Snowfall Impact Index – FEMA, disaster response	Heating & Cooling Degree Days – Energy Sector	Temperature & Precipitation Outlooks – Agriculture	Billion $ Disasters, Climate Extremes Index – Insurance
Regional	Hurricane Tracks – Emergency Planners	Space Weather – Aviation Industry	Drought Outlook – Agriculture	Climate Normals – Construction, Infrastructure, Agriculture
National & Global	Drought Monitor – Agriculture	Global and U.S. Climate Summaries – Numerous Sectors	Annual State of the Climate Reports – Scientists	IPCC & National Climate Assessments – Gov't Policymakers

NOAA’s National Centers for Environmental Information (NCEI) –

Climate Science and Service Division






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**”

- NCEI’s U.S. billion-dollar disaster analysis seeks to bring the best public and private disaster loss data together in a systematic approach. To that end, we maintain a consistent record of weather and climate disasters with costs equaling or exceeding $1 billion in damages (adjusting for inflation) using high-quality data sources and peer-reviewed methods.

- **Period of record: 1980-2021 (Quarterly updates)**
- The U.S. has sustained **323** separate weather and climate disasters since 1980 where overall damages/costs reached or exceeded $1 billion.
- **Total, direct costs exceed $2.195 trillion (CPI-adjusted to 2022).**

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 / Storm Events Database	x	x	x	x	x	x	x

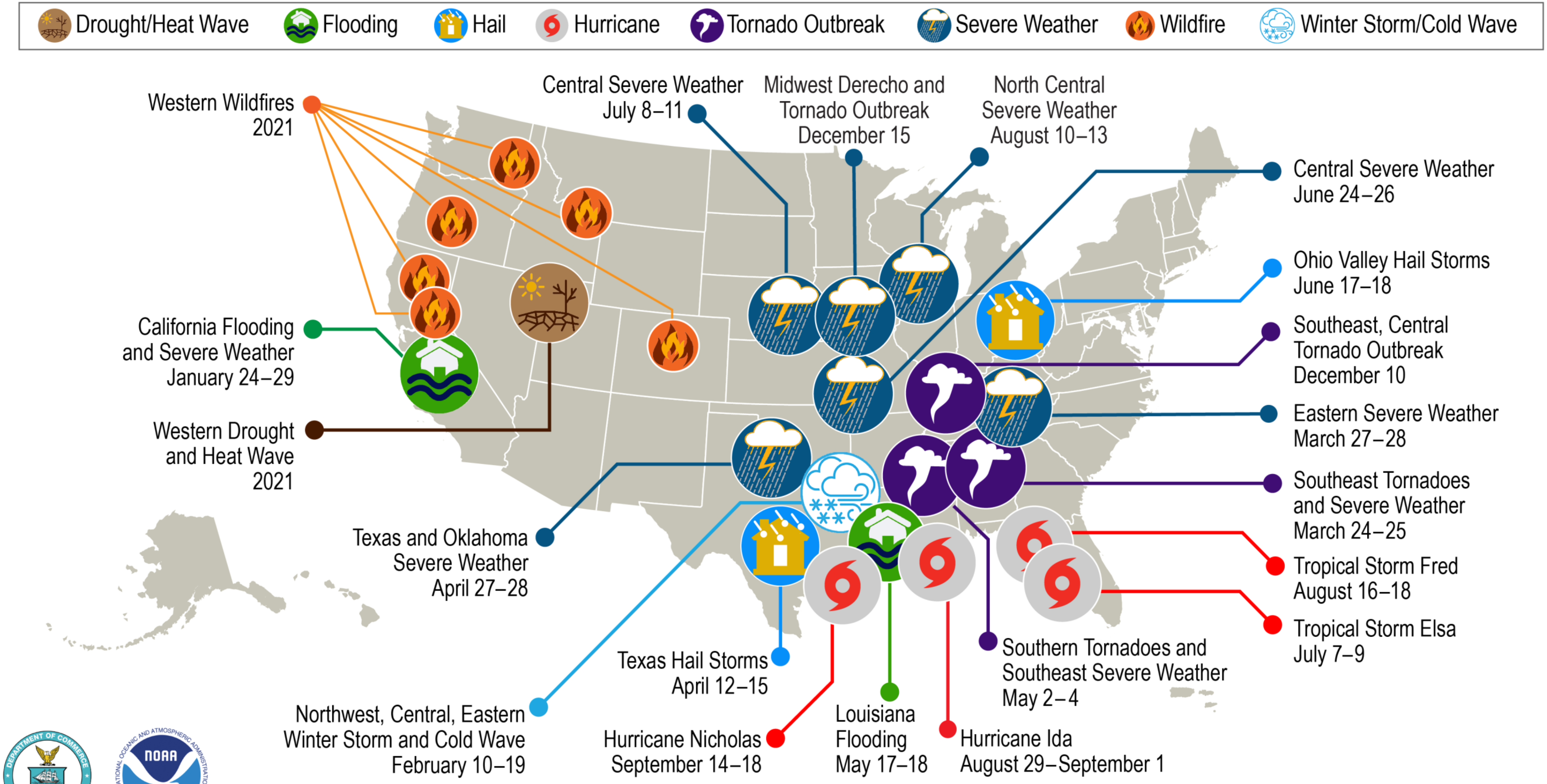
Account for <u>total, direct losses</u> (i.e., **insured** and **uninsured**) for assets including:

- **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, levees, buildings)
- **Agricultural / forestry assets** (i.e., crops, livestock, commercial timber, wildfire fighting)

We <u>do not</u> account for:

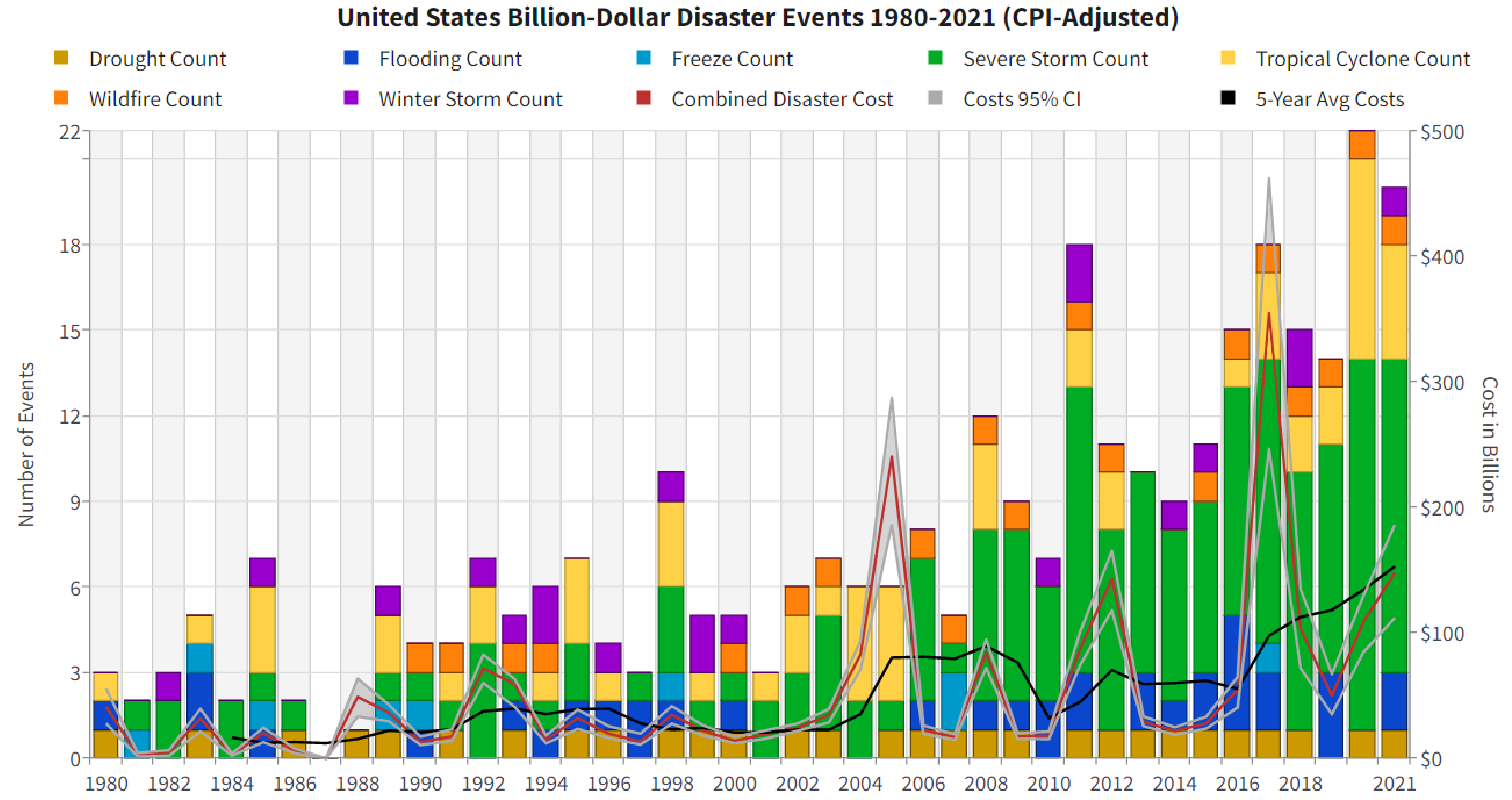
- natural capital/envn. degradation;
- mental or physical healthcare-related costs;
- all downstream (indirect) costs

U.S. 2021 Billion-Dollar Weather and Climate Disasters



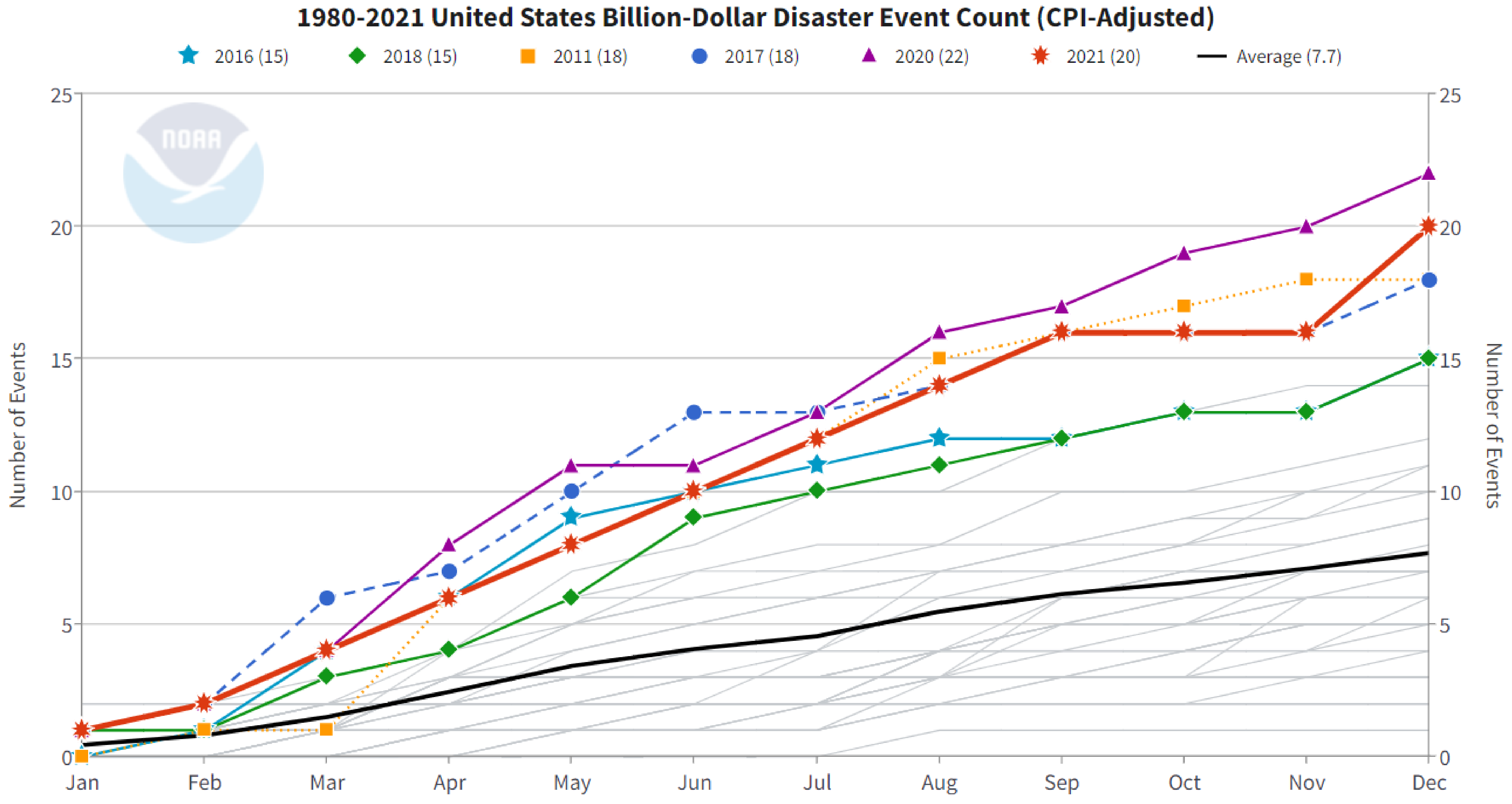
*This map denotes the approximate location for each of the **20 separate billion-dollar weather and climate disasters that impacted the United States in 2021***

U.S. Billion-dollar event frequency, annual cost, 5-year cost average (1980–2021)



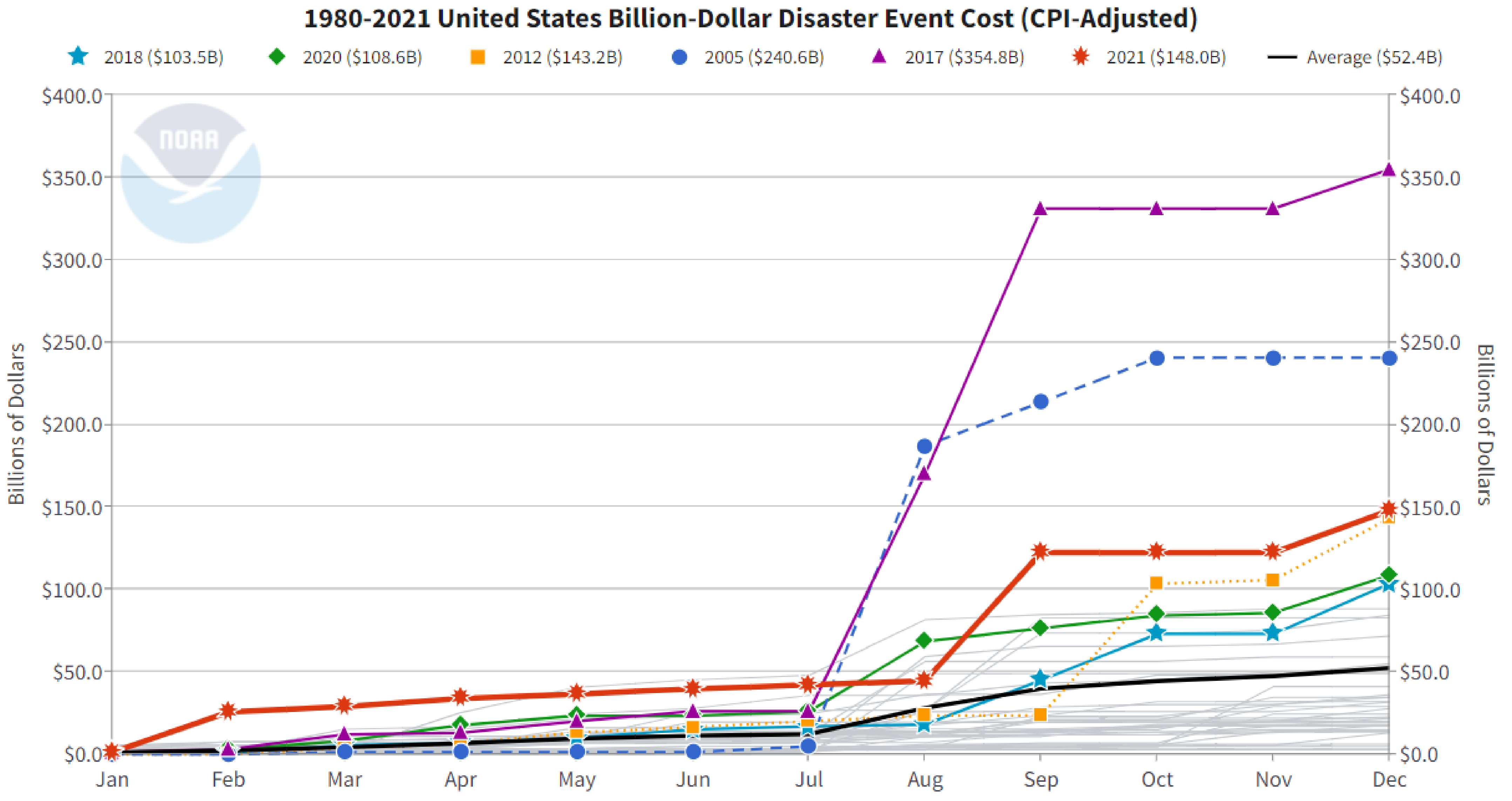
- Western wildfires, severe storms, inland flooding and hurricane costs all on the rise
- <u>**5-year annual cost average**</u> >**$152.9 billion - a record;** costs over **5 years** (2017-2021) **$764.9 billion - a record**

Cumulative U.S. billion-dollar disaster frequency (year-to-date) for years 1980-2021



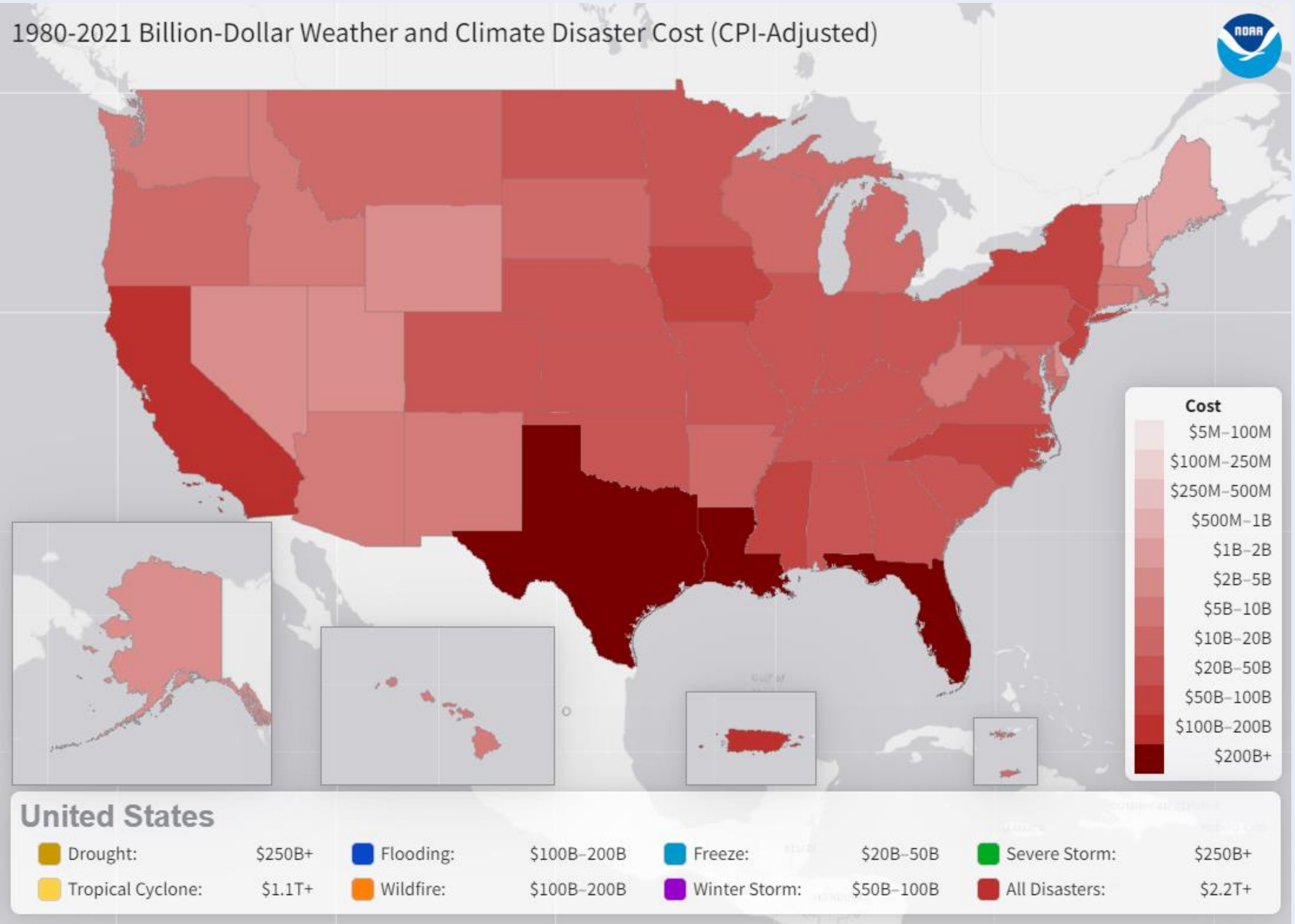
- **1980 – 2021** annual average: **7.7 events** (CPI-adjusted). **2017–2021** 5-year average: **17.8 events** (CPI-adjusted)
- **2021 - 20 events** [11 severe storm events, 4 tropical cyclones, 2 floods, 1 winter storm, drought & wildfire]

Cumulative U.S. billion-dollar disaster cost (year-to-date) for years 1980-2021



- **2021** cost total (**$148.0 billion – 3rd highest**) vs. the 42-year period of record at **$52.4 billion**
- The **top 3 most costly years** for U.S. - **2017** ($354.8 billion); **2005** ($240.6 billion); **2021** ($148.0 billion)

From 1980–2021, 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.



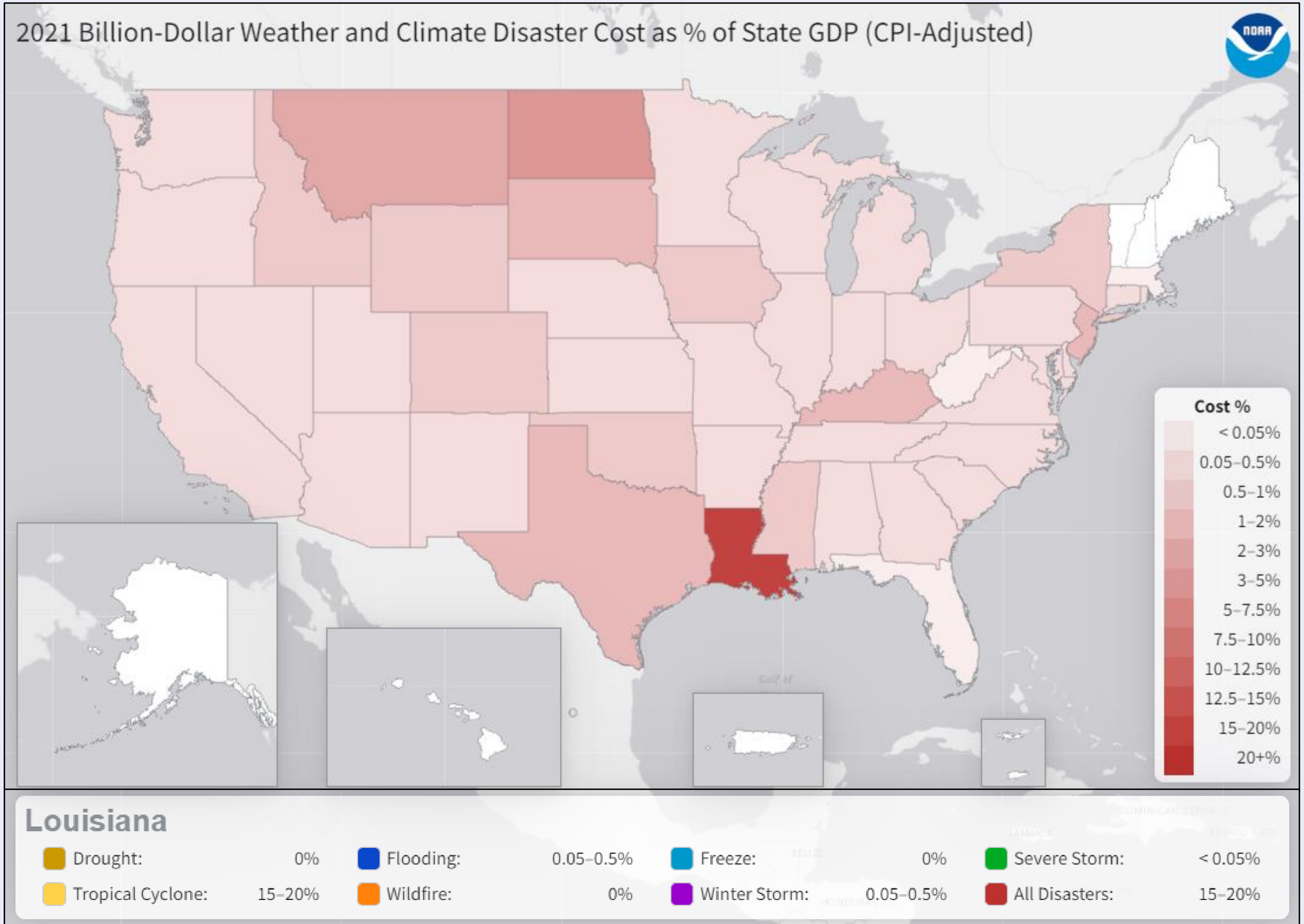
- Reflects the **severity, vulnerability and exposure** of weather and climate events impacting different regions

- The **top 3 most impacted states:**
  - **Texas** ($349 billion)
  - **Louisiana** ($278 billion)
  - **Florida** ($249 billion)

- The **relative costs are more acute in Louisiana**, as its population and economic size is much smaller than Texas or Florida.

- Louisiana also has a high frequency of disaster events, which can leads to compounding, cascading socioeconomic impacts.

The **2021 disaster costs** for each state as a **% of that state's 2021 GDP** (economic output)… clear impact from billion-dollar disaster events.



- Reflects the **severity** & **vulnerability** of weather & climate events vs. scale of each state's economy

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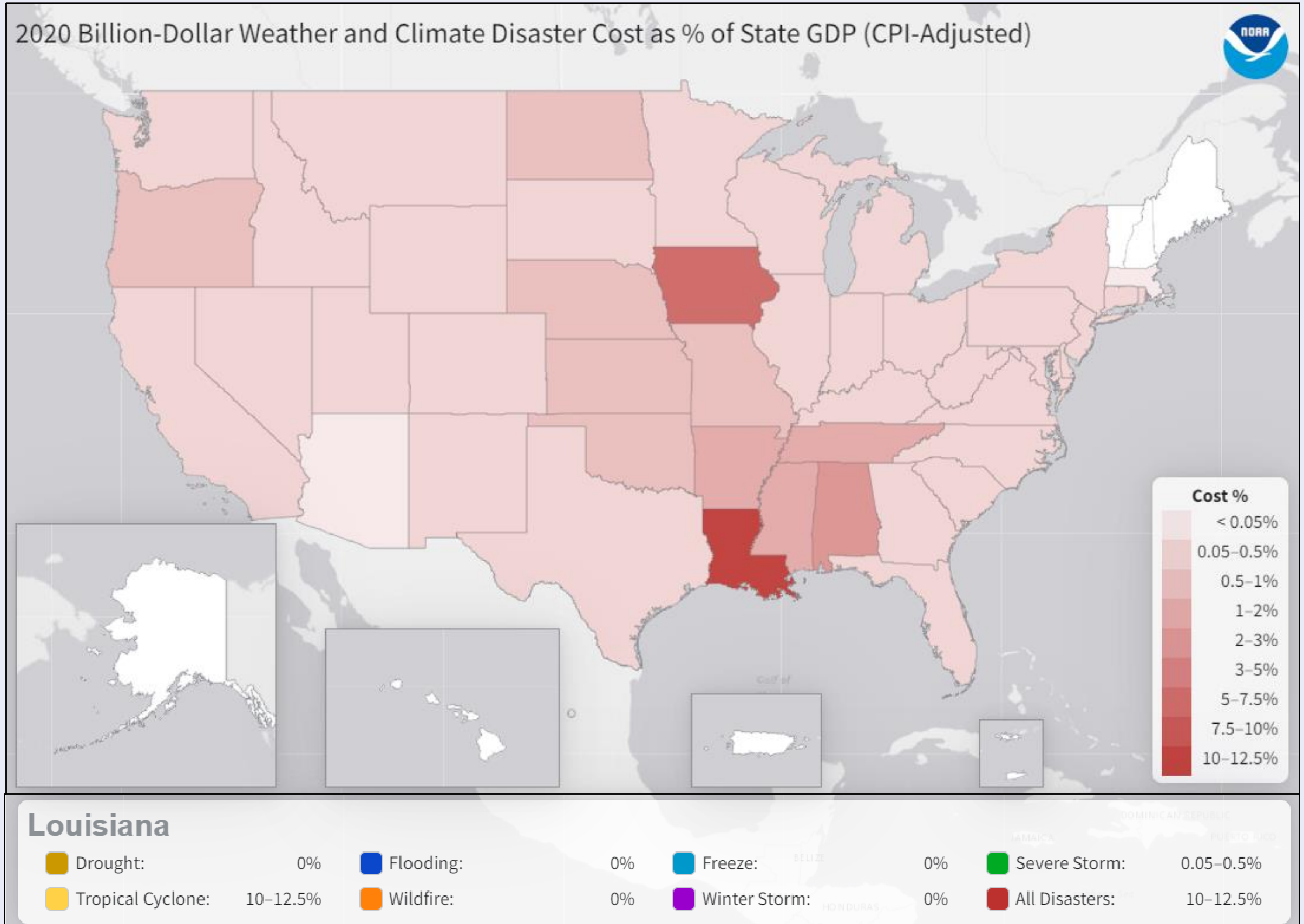


- Reflects the **severity** & **vulnerability** of weather & climate events vs. scale of each state’s economy
- Compound hazards and cascading impacts slow down recovery and increase the cost

From **1980-2021**, the U.S. has experienced **323** distinct billion-dollar weather & climate events - each causing at least $1 billion in direct losses

- **Total, direct losses** from these **323 events** exceeds **$2.195 trillion** (CPI-adjusted, 2022)

Disaster Type	Events	Events/Year	Percent Frequency	Total Costs	Percent of Total Costs	Cost/Event	Cost/Year	Deaths	Deaths/Year
Drought	29	0.7	9.0%	$291.1B CI	13.2%	$10.0B	$6.9B	4,139†	99†
Flooding	36	0.9	11.1%	$168.4B CI	7.7%	$4.7B	$4.0B	634	15
Freeze	9	0.2	2.8%	$33.7B CI	1.5%	$3.7B	$0.8B	162	4
Severe Storm	152	3.6	47.1%	$344.8B CI	15.7%	$2.3B	$8.2B	1,975	47
Tropical Cyclone	57	1.4	17.6%	$1,157.1B CI	52.6%	$20.3B	$27.6B	6,708	160
Wildfire	20	0.5	6.2%	$123.6B CI	5.6%	$6.2B	$2.9B	418	10
Winter Storm	20	0.5	6.2%	$81.0B CI	3.7%	$4.1B	$1.9B	1,313	31
All Disasters	**323**	**7.7**	**100.0%**	**$2,199.7B** CI	**100.0%**	**$6.8B**	**$52.4B**	**15,349**	**365**

†Deaths associated with drought are the result of heat waves. (Not all droughts are accompanied by extreme heat waves.)

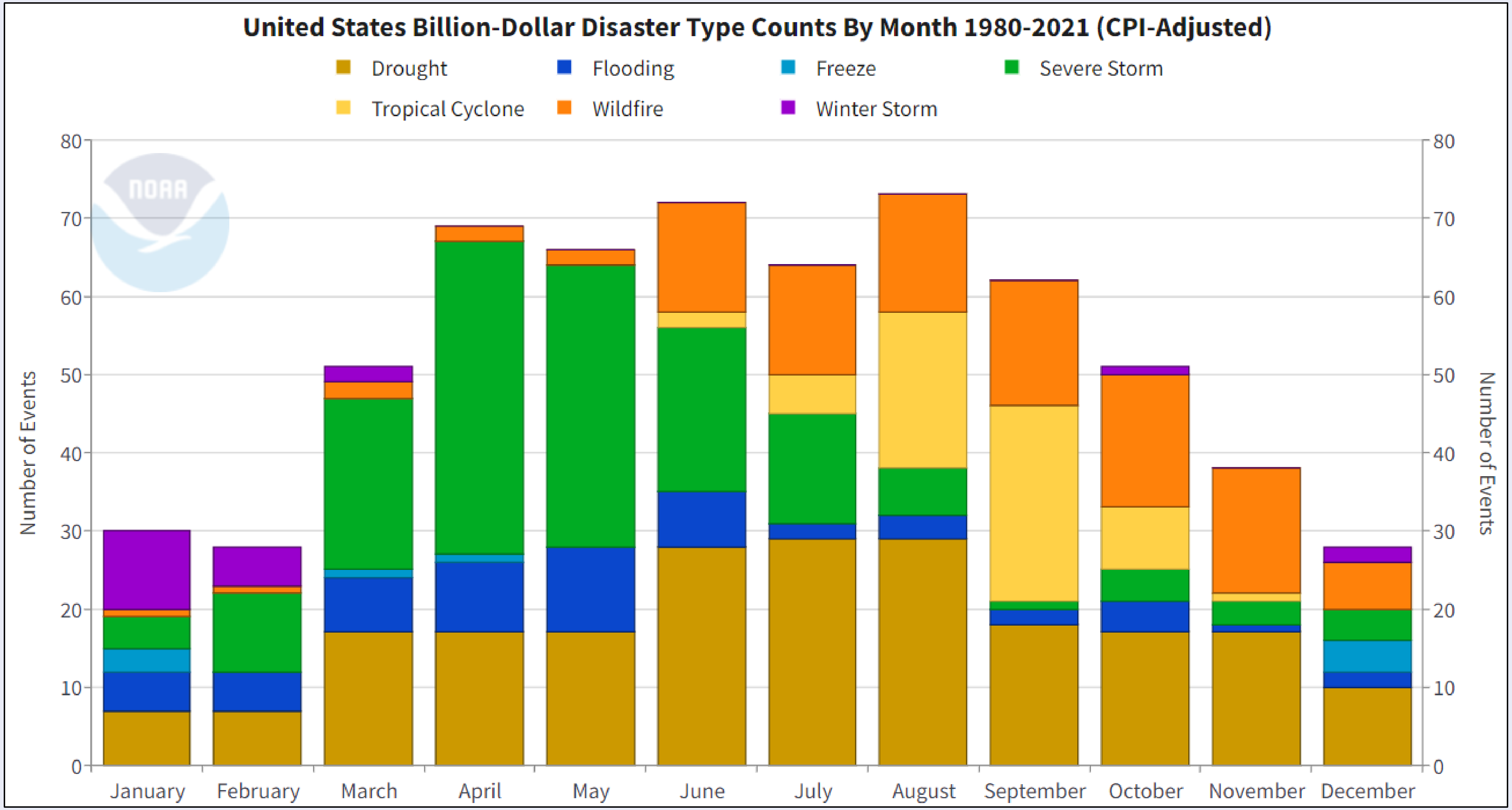
Flooding events (river basin or urban flooding from excessive rainfall) are separate from inland flood damage caused by tropical cyclone events.

Comparison of U.S. Billion-dollar disaster stats over time

Time Period	Billion-Dollar Disasters	Events/Year	Cost	Percent of Total Cost	Cost/Year	Deaths	Deaths/Year
1980s (1980-1989)	31	3.1	$195.2B	8.9%	$19.5B	2,975	298
1990s (1990-1999)	55	5.5	$298.4B	13.6%	$29.8B	3,062	306
2000s (2000-2009)	67	6.7	$558.0B	25.4%	$55.8B	3,102	310
2010s (2010-2019)	128	12.8	$891.5B	40.5%	$89.2B	5,224	522
Last 5 Years (2017-2021)	89	17.8	$764.9B	34.8%	$153.0B	4,555	911
Last 3 Years (2019-2021)	56	18.7	$306.6B	13.9%	$102.2B	1,030	343
Last Year (2021)	20	20.0	$148.0B	6.7%	$148.0B	724	724
All Years (1980-2021)	**323**	**7.7**	**$2,199.7B**	**100.0%**	**$52.4B**	**15,349**	**365**

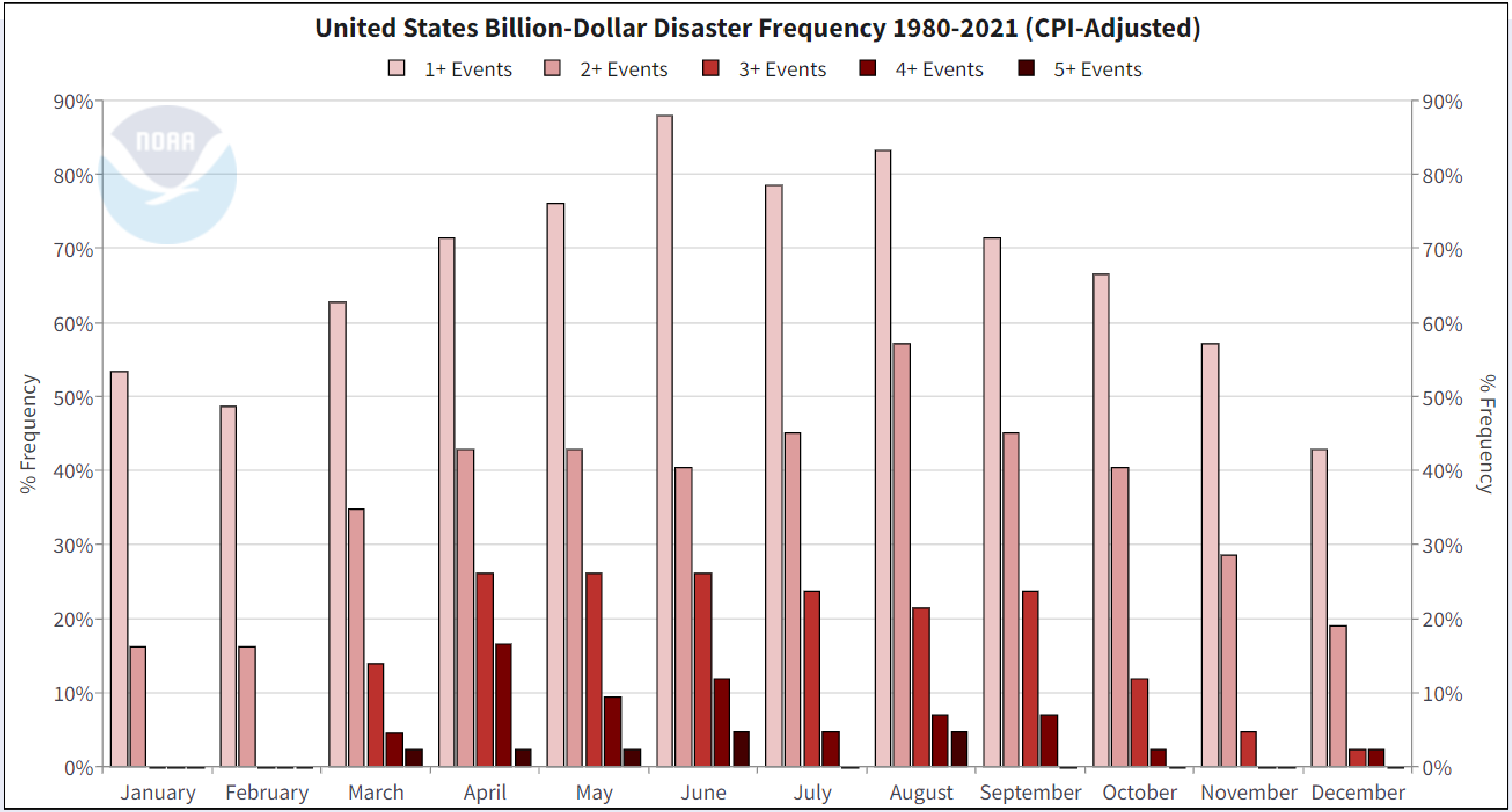
The **number and cost of disasters are increasing over time** due to a **combination of** increased exposure (i.e., values at risk of possible loss), vulnerability (i.e., where we build; how we build) and that climate change is increasing the frequency of some types of extremes that lead to billion-dollar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

Severe storm and **inland flooding events** frequent during **Spring** and **Summer**
Wildfires and **hurricanes** most frequent during **Fall** months.



- Visualizing the 42-year **frequency of climatology of extreme**, damaging events across the Nation.
- A way for decision-makers to understand which types of large events typically occur at what times of year, by region.

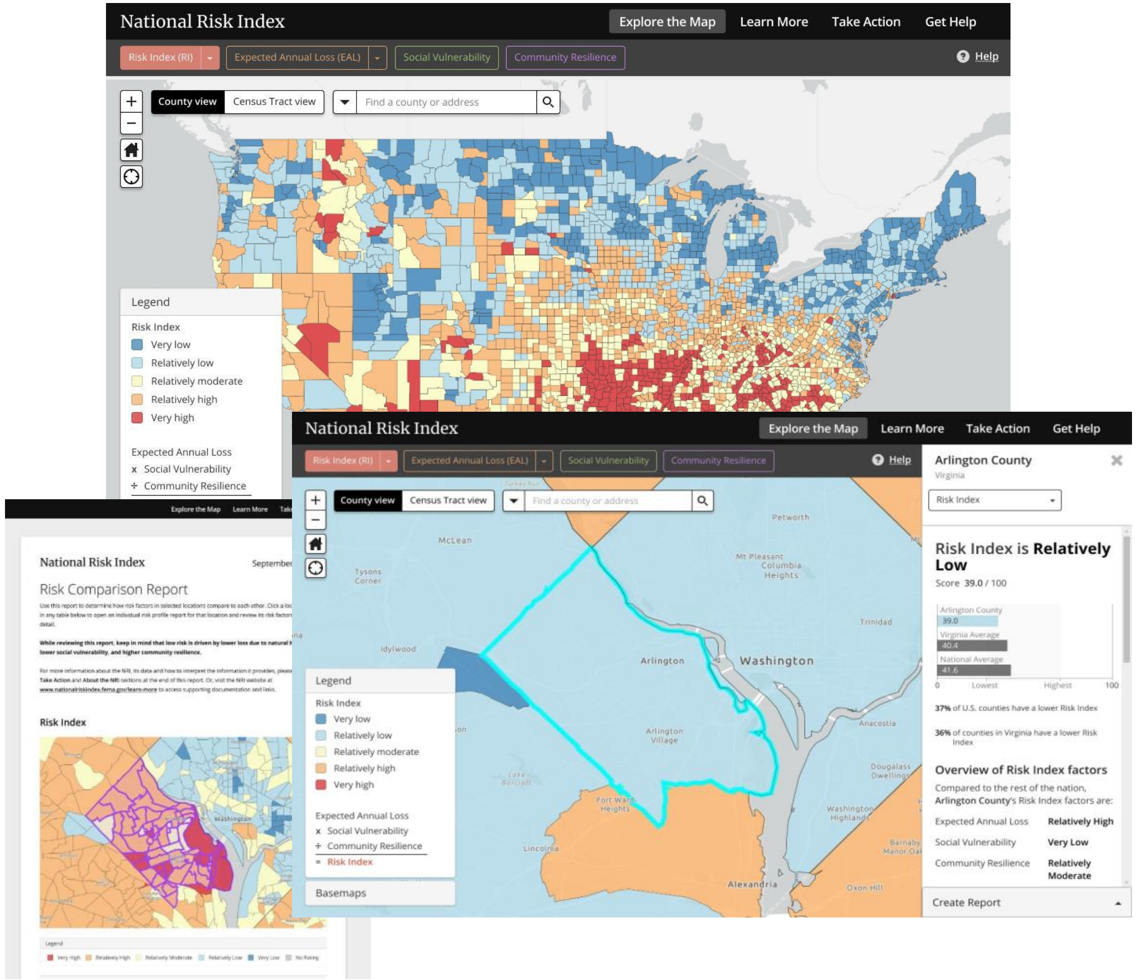
Historic record for multiple, billion-dollar events, by month



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**."

New: Integration & expansion of FEMA National Risk Index within the Billion-dollar disasters platform

- Provides pre-calculated, top- down national baseline risk assessment
- Identifies areas that offer high return on mitigation investment
- Encouraging community level risk communication and engagement
- Supporting the development or enhancement of codes and standards
- Prioritizing and allocating resources
- Identifying the need for more refined risk assessments



FEMA

Calculating Risk

Risk = Expected Annual Loss x Social Vulnerability ÷ Community Resilience

where Expected Annual Loss (EAL) =

Annual Frequency		Exposure		Historic Loss Ratio
Rate of occurrence	**X**	**• Property Value • People • Agriculture**	**X**	**Percentage of property/people/crop losses**
How likely is hazard to occur?		How many people & how much property are potentially at risk?		What percent of property/people have historically been lost from hazard in a given area?

Multi-hazard county weather and climate risk mapping

- NCEI worked with & expanded upon FEMA's NRI to enhance the NOAA Billion-dollar disaster website producing new, interactive U.S. **county & Census-tract hazard risk maps** for <u>any combination of</u>:

  hurricanes, severe storms (tornado, hail, damaging winds), inland/urban flooding, drought/heat wave, wildfire, winter storms and freeze/cold wave events.

- Importantly, these maps offer more <u>granular information</u> in relation to <u>**exposure, vulnerability and resilience**</u> to weather & climate hazards, at a <u>county scale</u>.

- These new hazard combination maps are useful as we see more focus on <u>**cascading hazard impacts**</u>

  For example: drought-enhanced wildfires produce mountain-side burn scars, which often enhance debris flows from flooding. This is a compound hazard with cascading impacts that we see in California.

Estimating Annualized Frequency: Rate of hazard occurrence

SOURCE DATA

HISTORICAL EVENT DATA

Strong Wind | Tornado | Winter Weather | Cold Wave | Hail | Heat Wave | Riverine Flooding

- Storm Events Database
- Severe Weather Database
- Weather Alerts

Hurricane | Lightning | Tsunami

- HURDAT2 Best Track
- Cloud-to-Ground Lightning
- Tsunami Runup Data

Drought (NDMC) | Ice Storm (CRREL) | Landslide (NASA)

PROBABILISTIC MODELS

Earthquake (USGS) | Wildfire (Forest Service)

HIGH THREAT AREAS

Avalanche (Forest Service) | Volcano (Smithsonian Institution) | Coastal Flooding (National Flood Insurance Program, NOAA)

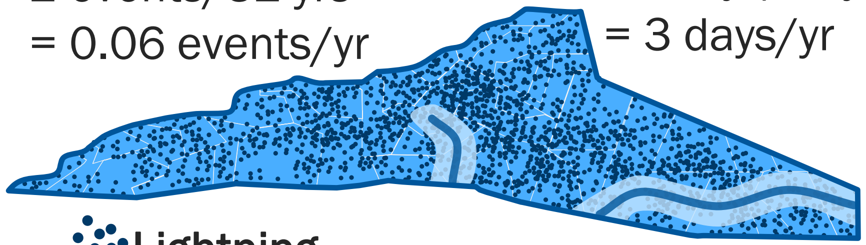
- HURDAT2
- Sea level rise
- High tide

CENSUS TRACT FREQUENCY ESTIMATES

of historical events or event days depending on hazard

Tornado
2 events/32 yrs
= 0.06 events/yr

Heat Wave
36 days/12yrs
= 3 days/yr



Lightning
2200 events/22 yrs = 100 events/yr

Establishing Hazard Exposure: People/property/ag at risk

Many hazards impact the entire county/census tract while some are limited to susceptible zones

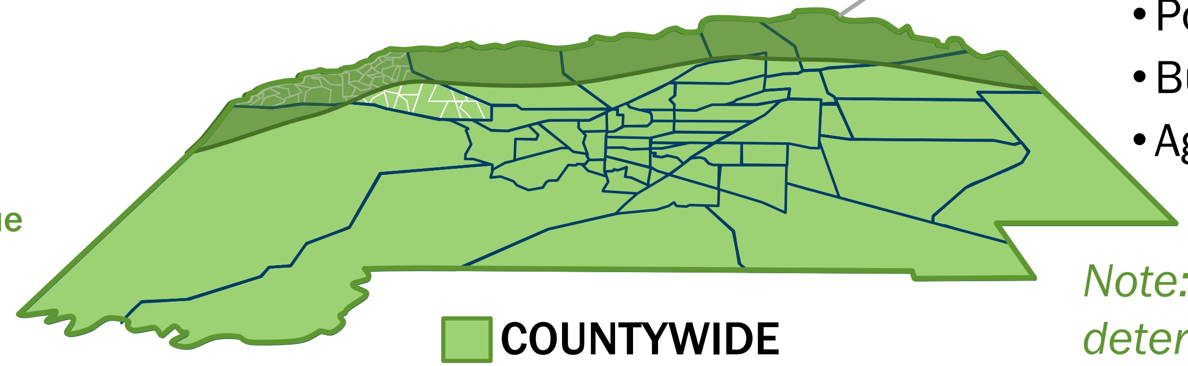
SOURCE DATA

HAZUS®
EARTHQUAKE • WIND • FLOOD • TSUNAMI

- Population
- Building Value

2017 CENSUS OF AGRICULTURE

- Agriculture



HAZARD SUSCEPTIBLE ZONE

- Population: 300K
- Building Value: $90B
- Agriculture: $120M

COUNTYWIDE

- Population: 1.3M
- Building Value: $250B
- Agriculture: $720M

Note: Susceptible areas determined by hazard-specific source data polygons

Characterizing Historic Loss Ratios: % of exposure lost in historic events

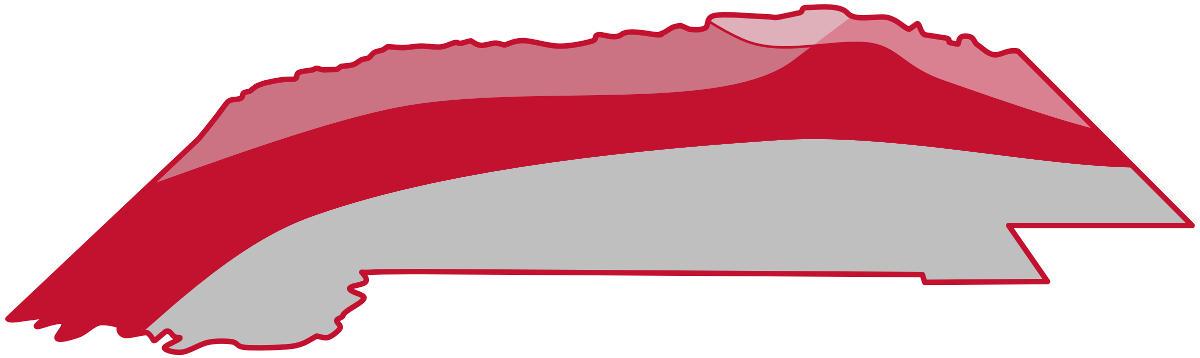
To address variance & lack of enough events for statistical significance, **county ratios are calculating using Bayesian adjustments informed by averages from multiple geographic levels**

SOURCE DATA

Spatial Hazard Events & Losses Database for the U.S. (SHELDUS)

Arizona State University

DATA



BAYESIAN CREDIBILITY ADJUSTMENTS

- U.S.
- Region
- Area
- County

Historic Loss Events

Event	Loss / Exposure
9/91	$50M/$250B = 0.02%
6/07	$300M/$250B = 0.1%
8/14	$15B/$250B = 6%

County Historic Loss Ratio

Simple	Adjusted
2.1%	1.3%

Social **Vulnerability** and Community **Resilience**

Social Vulnerability Index: SoVI 2010-2014

- Grouped into **7 components with 29 variables** (SoVI 2010):
    - **Race and class (7 variables), Wealth (5 variables), Elderly residents (6 variables), Hispanic ethnicity (5 variables), Special needs individuals (2 variables), Native American ethnicity (1 variables), and Service industry employment (2 variables)**
- Comparative index at the county & census tract levels
- Positive and negative component loading

Baseline Resilience Indicators for Communities: BRIC 2010-2014

- **6 resilience category scores**, plus total score
    - **Social, Economic, Community Capital, Institutional, Infrastructural, Environmental**
- Comparative indicators at the county level
- Indicators analyze the relationship between resilience, vulnerability, and the relative impact of disasters on rural and urban places

FEMA **NRI's "Social Vulnerability and Community Resilience Working Group reviewed multiple top-down and bottom-up indices** and chose to recommend the University of South Carolina's Hazards and Vulnerability Research Institute (HVRI) Social Vulnerability Index (SoVI)."

HVRI HAZARDS & VULNERABILITY RESEARCH INSTITUTE

UNIVERSITY OF SOUTH CAROLINA

FEMA

$$\text{Risk} = \frac{\text{Expected Annual Loss} \times \text{Social Vulnerability}}{\text{Community Resilience}}$$

Rating Category
Very High
Relatively High
Relatively Moderate
Relatively Low
Very Low

Expected Annual Loss
Social Vulnerability

Higher Expected Annual Loss & Social Vulnerability = Higher Risk

Community Resilience

Lower Community Resilience = Higher Risk

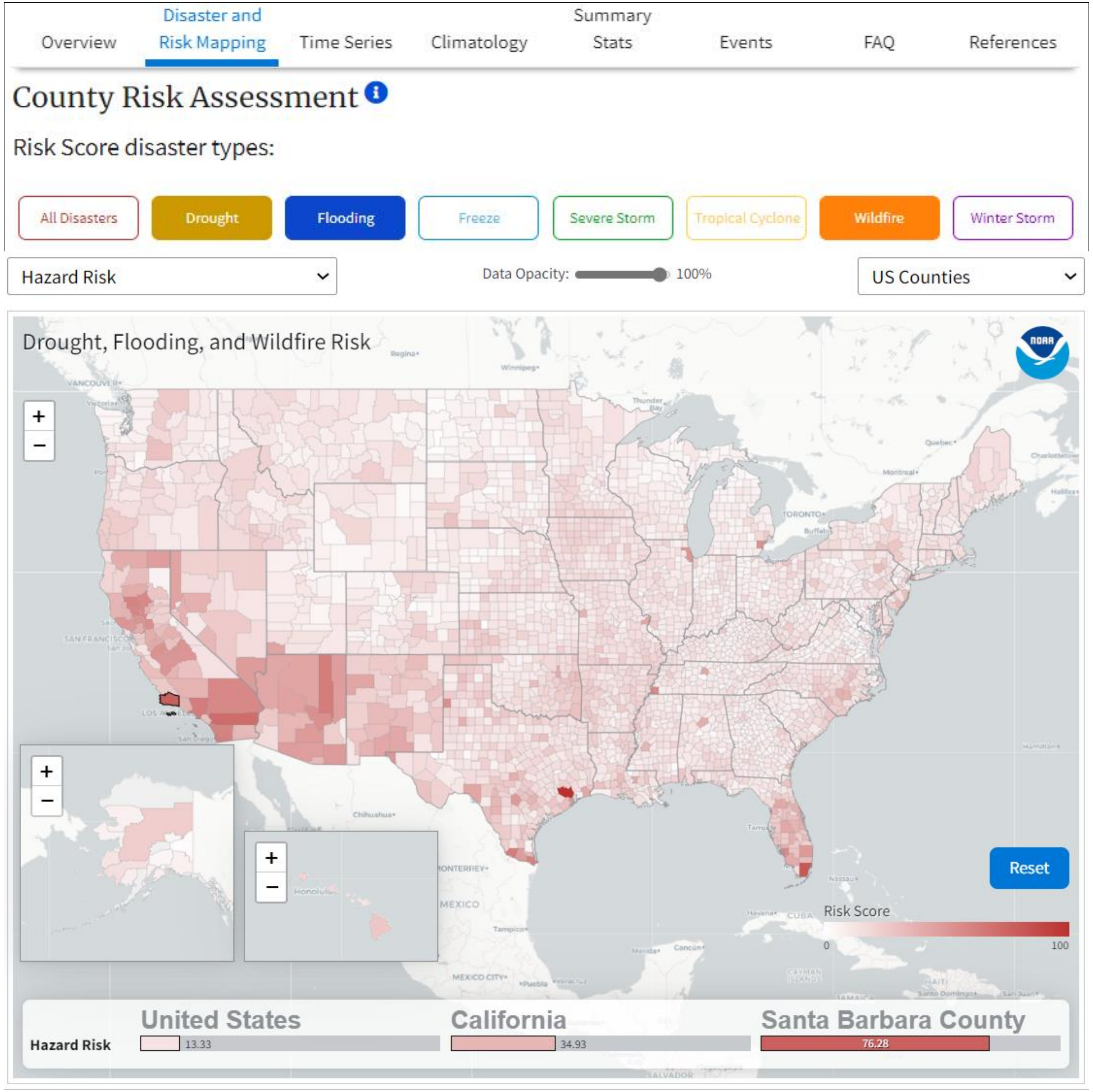
Illustration of Risk Component Scores

County	Expected Annual Loss	Social Vulnerability	Community Resilience	Risk
County 1	100	45	52	100
County 2	26	94	58	55
County 3	54	48	35	51
County 4	16	92	56	37
County 5	32	36	44	24
County 6	22	45	43	22
County 7	9	69	59	15
County 8	25	21	57	13
County 9	10	44	45	9
County 10	16	4	39	1

All scores are constrained to a range of 0 (lowest possible value) to 100 (highest possible value). To achieve this range, **the values of each component are rescaled using min-max normalization, which preserves their distribution** while making them easier to understand. EAL values are heavily skewed by an extreme range of population and building value densities between urban and rural communities. **To account for this, a cube root transformation is applied before min-max normalization.**

By applying cube root transformation, the National Risk Index controls for this characteristic and provides scores with greater differentiation and usefulness. If the minimum value of the EAL is a nonzero number before normalization, an artificial minimum is set to 99% of that value so that communities expected to experience loss do not receive a 0 EAL score

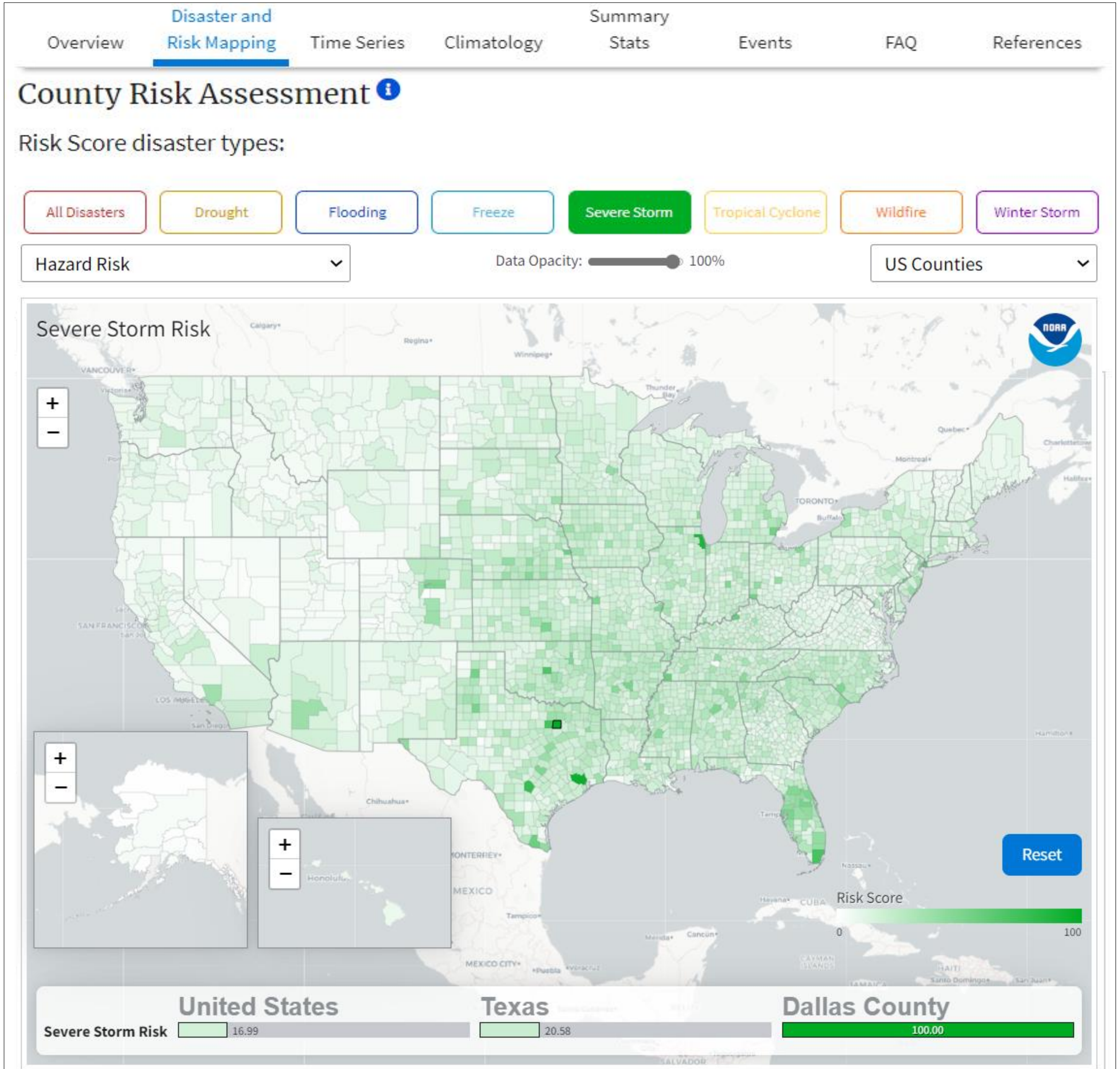
FEMA



Compound hazard county risk (Drought, Wildfire and Flooding)

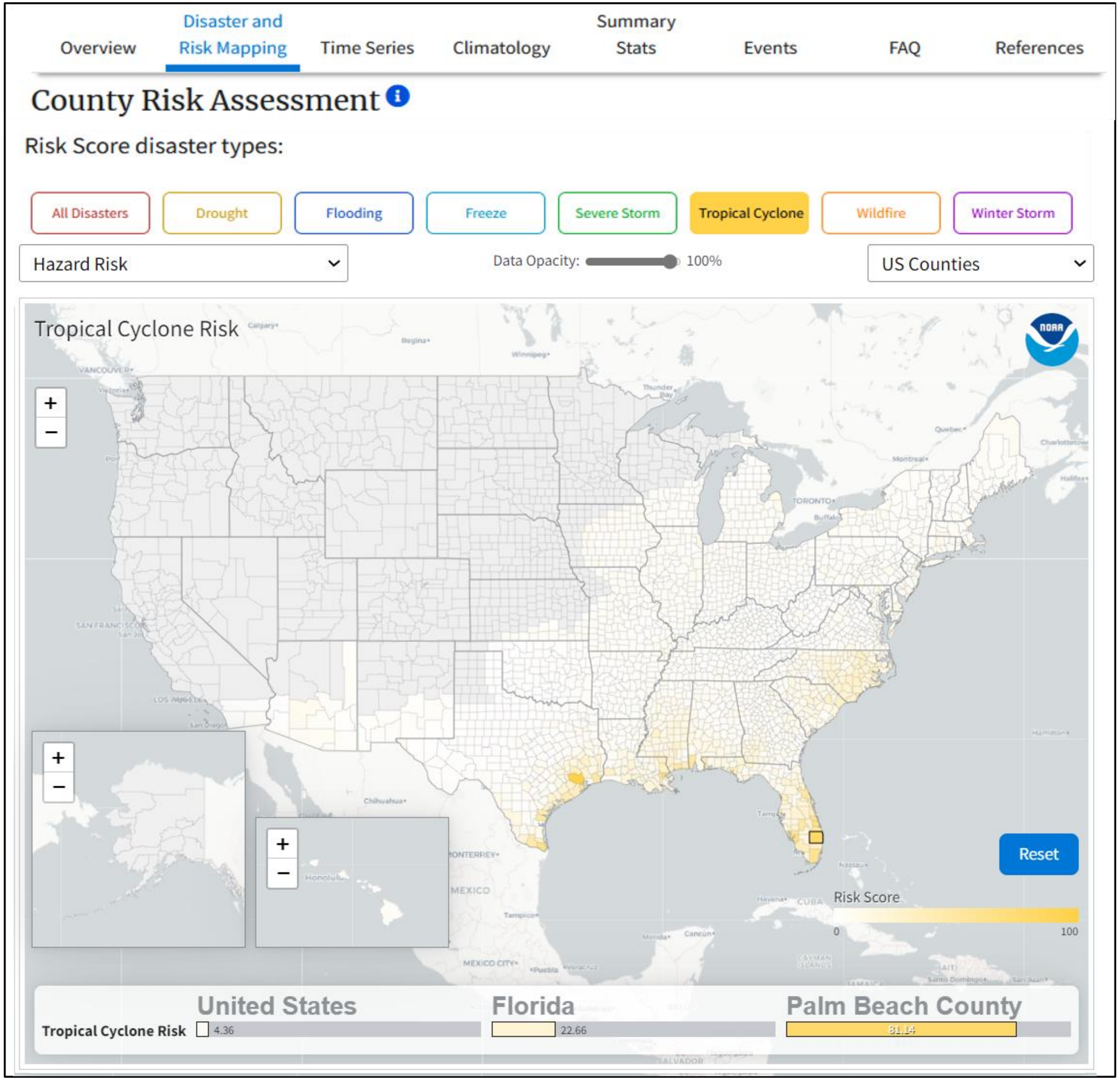
Each region faces **unique hazard combinations, which are useful in <u>a new era of more likely cascading hazard impacts</u>** (i.e., drought-enhanced wildfires produce mountain-side burn scars, which often enhance debris flows from flooding.

As noted in National Climate Assessment (2017) **"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."**



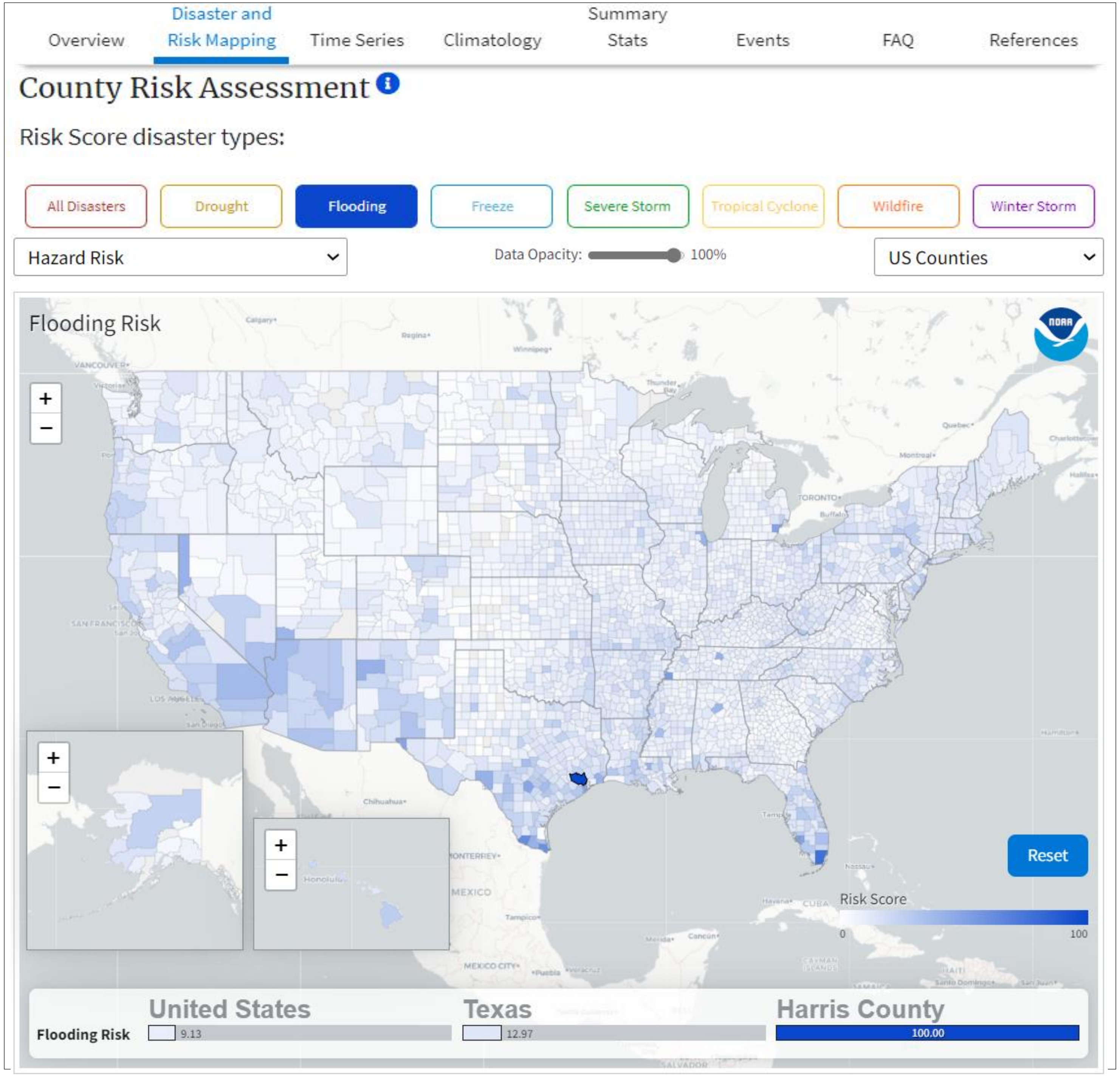
This map provides county risk scores for combined **severe storm events (i.e., tornado, hail, high wind damage)** reflecting a county's annualized hazard frequency; its potential hazard cost related to building value, crop value and population exposure; and its social vulnerability and resilience to recover from hazard impacts based on dozens of socioeconomic variables.

The map highlights that **Dallas County, Texas has a very high score for severe storm risk** due to its historic frequency of being impacted by these events in addition to having a large urban population and valuable exposure, which further increases the damage potential for severe storm impacts and costs.



Southern Florida is also at a very high risk for **hurricane impacts**, as this region also has the combination of high population, valuable property exposure and high potential for hurricane damage.

The distribution of damage costs from the U.S. Billion-dollar disaster events from 1980 to 2021 is dominated by tropical cyclone losses. **Tropical cyclones have caused the most damage** ($1,157.0 billion, CPI-adjusted) and also have the highest average event cost ($20.3 billion per event, CPI-adjusted).



Harris County, Texas - home to **Houston** as America's 4th most populous city - has a very high overall risk from <u>damaging urban flood events.</u>

The Houston area has been <u>**impacted by several 100-year urban flood events**</u> since the year 2015, in addition to **Hurricane Harvey in 2017.**

Harris County, TX
Risk Assessment

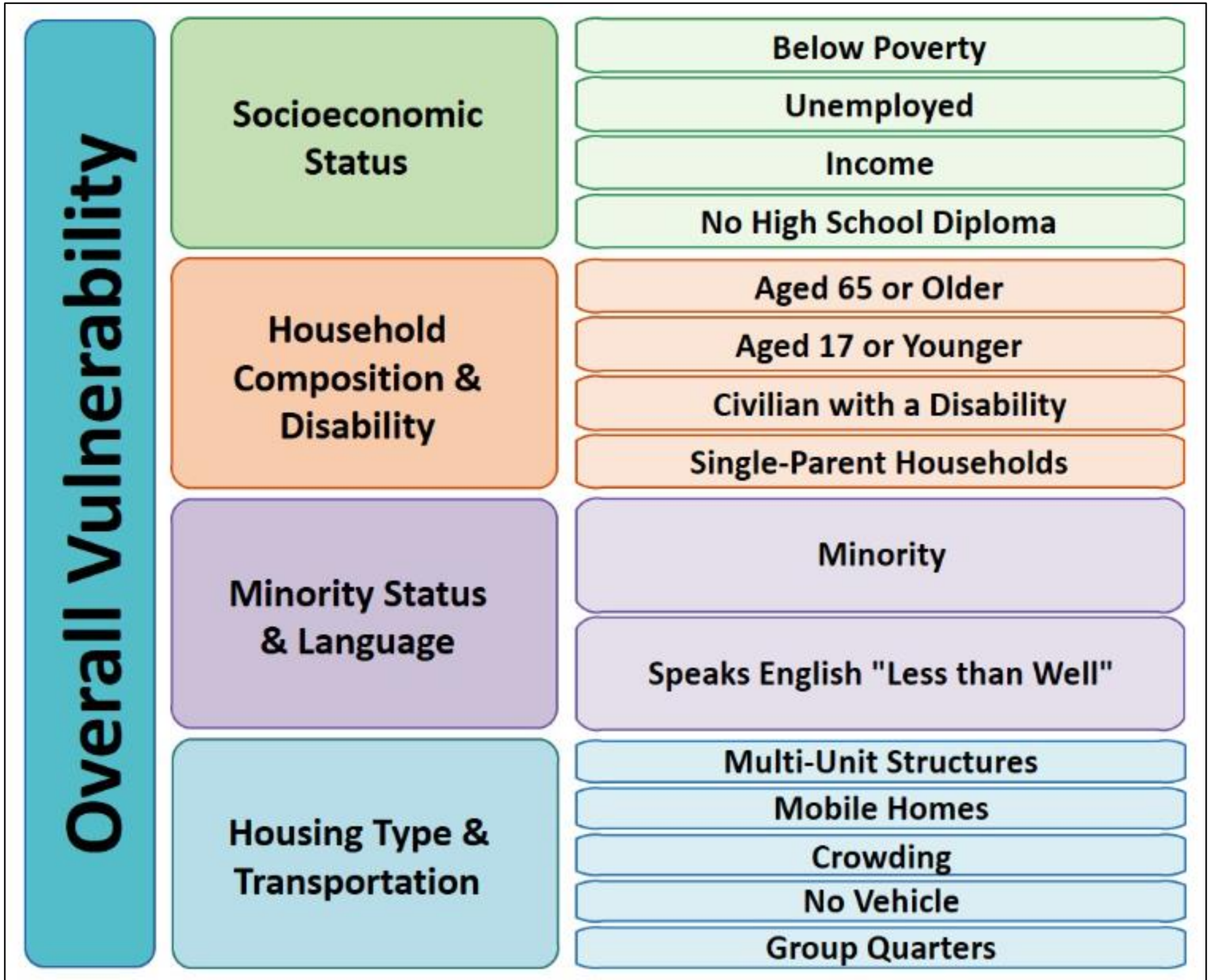
Historic Risk	Harris County	Texas	U.S.
Drought Risk	20.36	14.32	11.61
Flooding Risk	100.00	12.97	9.13
Freeze Risk	12.05	13.09	15.72
Severe Storm Risk	94.56	20.58	16.99
Tropical Cyclone Risk	100.00	8.63	5.74
Wildfire Risk	11.81	11.28	6.30
Winter Storm Risk	65.33	15.99	13.71
Weather and Climate Combined Risk	100.00	17.19	13.25
Social Vulnerability Index (SoVI®) Score	38.90	42.76	38.35

Harris County, Texas - home to Houston as America's 4th most populous city - has a **very high** overall **risk from damaging urban flood events, severe storm and hurricane impacts**.

The **Houston** area has been impacted by several **100-year urban flood** events since the year 2015, in addition to **Hurricane Harvey in 2017**.

Houston's large population and valuable infrastructure were also damaged from hazards such as the **mid-February 2021 winter storm / cold wave**, which crippled the regional power grid causing widespread damage and disruption.

Integrating CDC/ATSDR socioeconomic vulnerability metrics (U.S. Census American Community Survey data)



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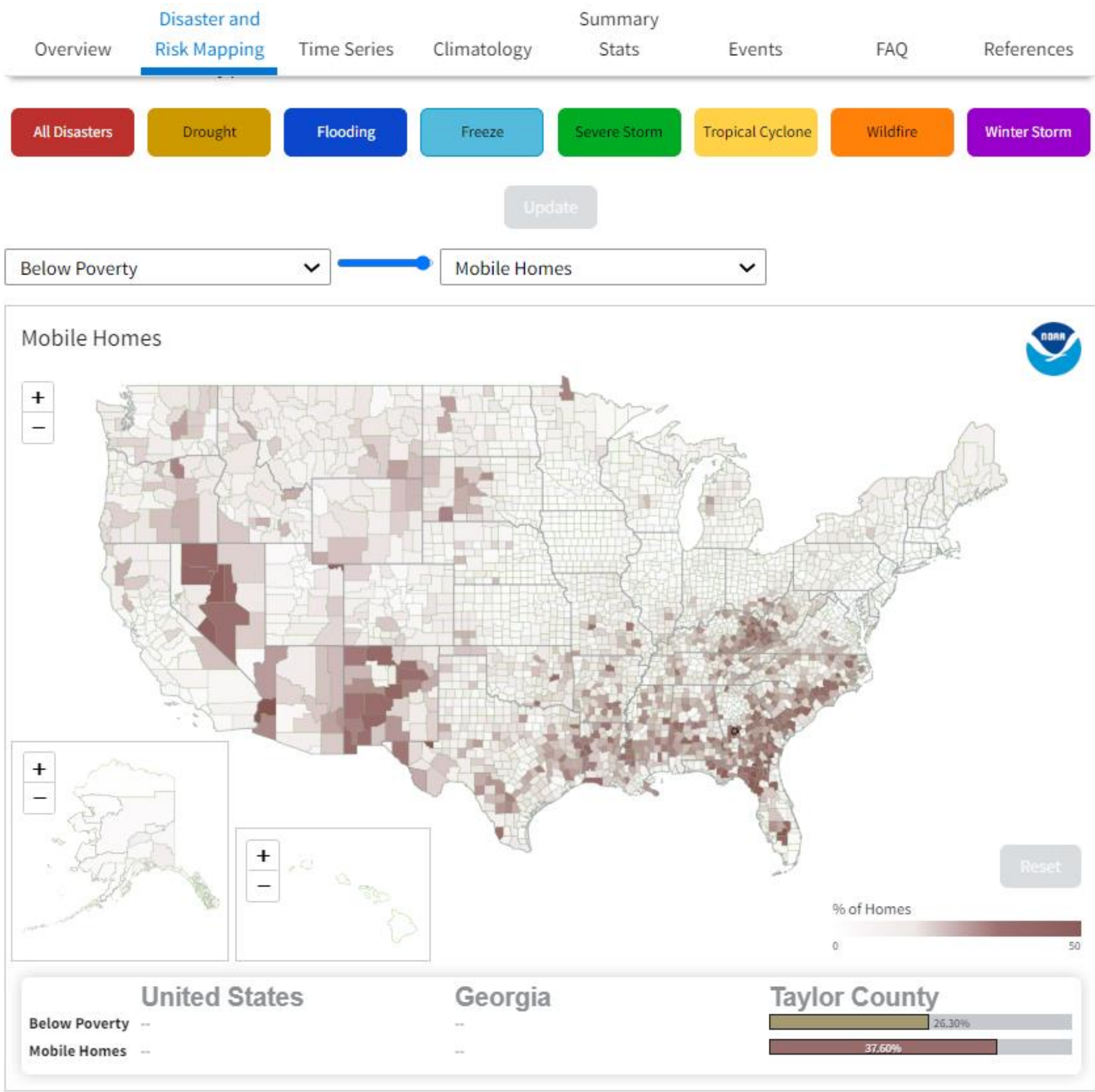
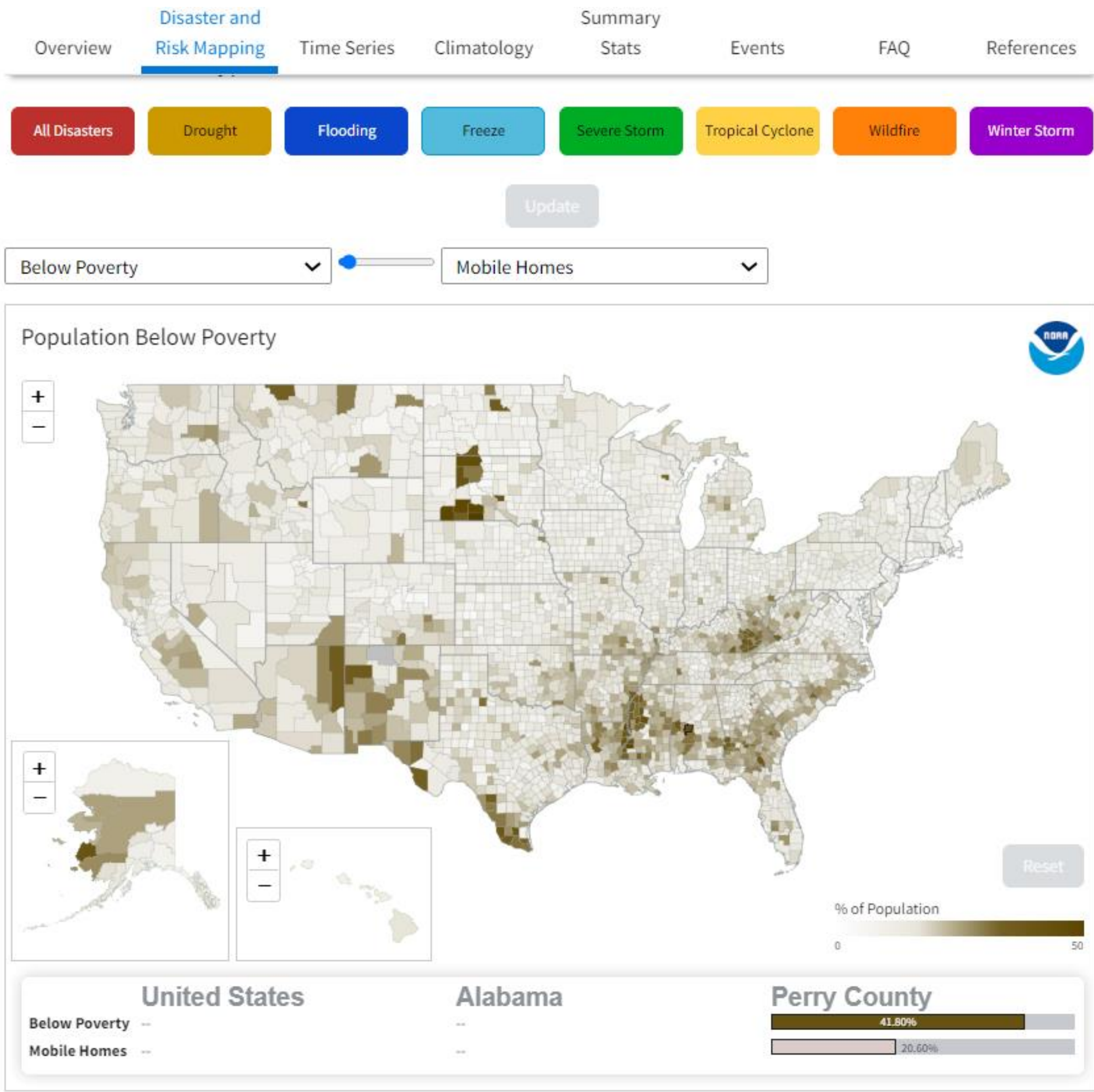
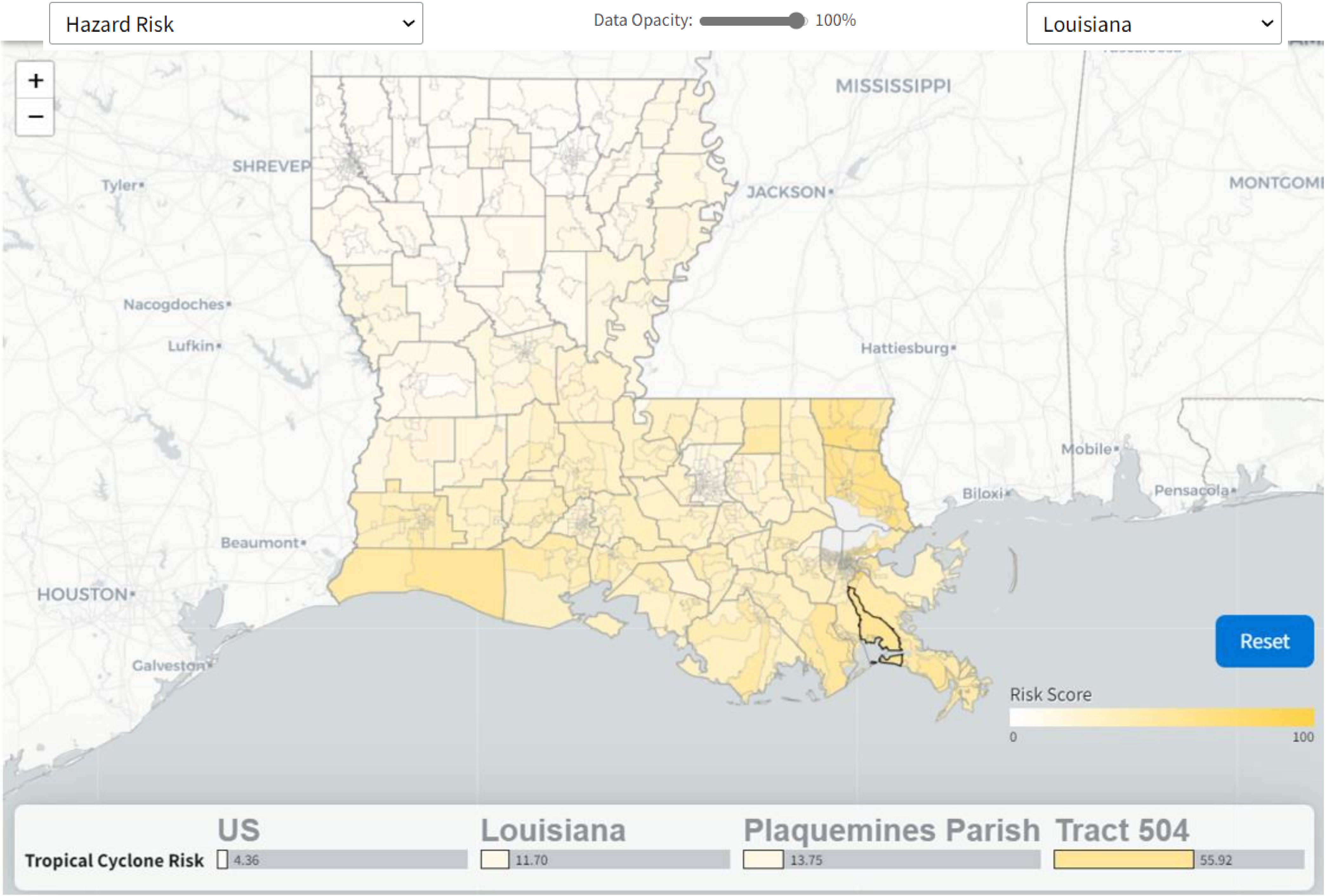
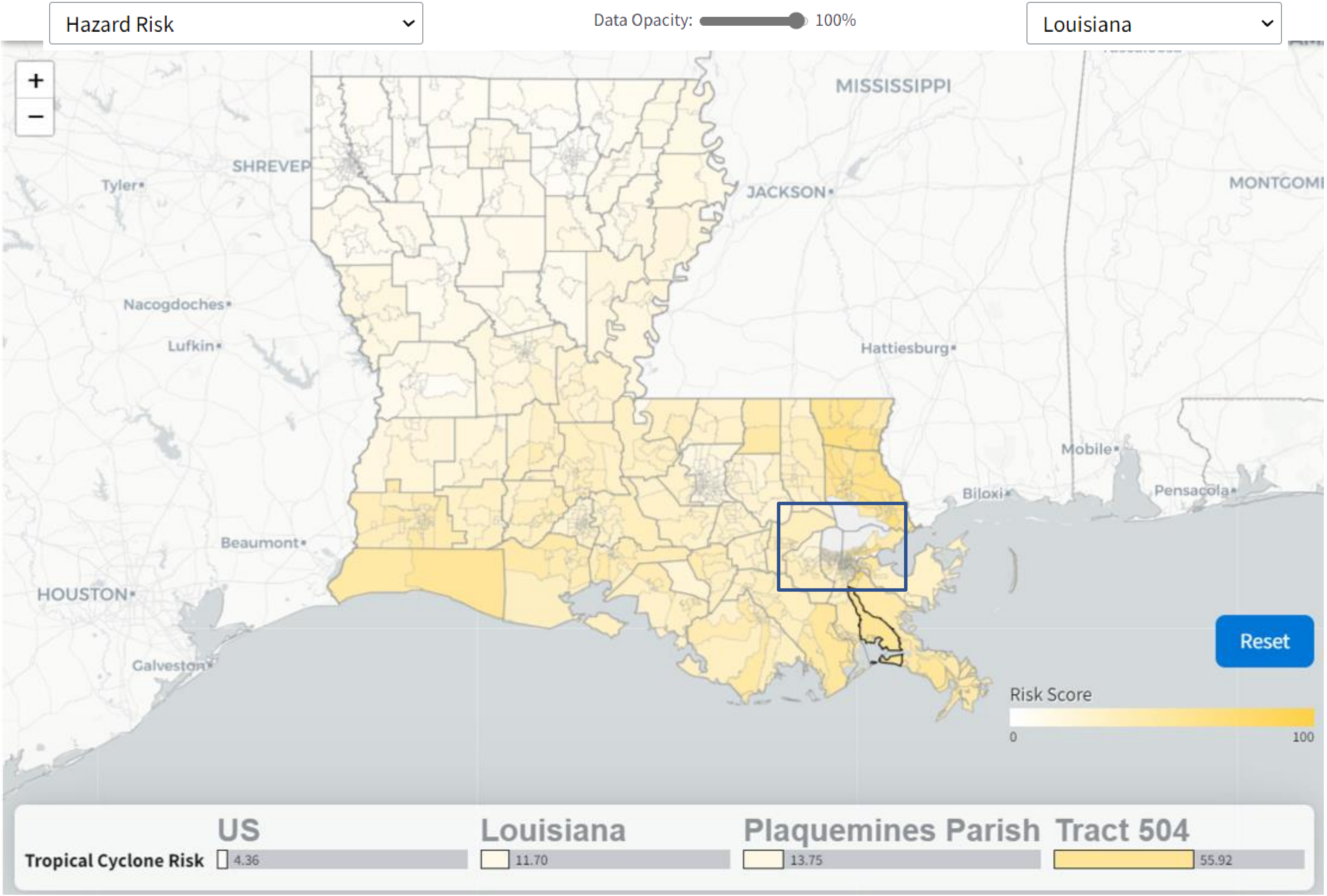
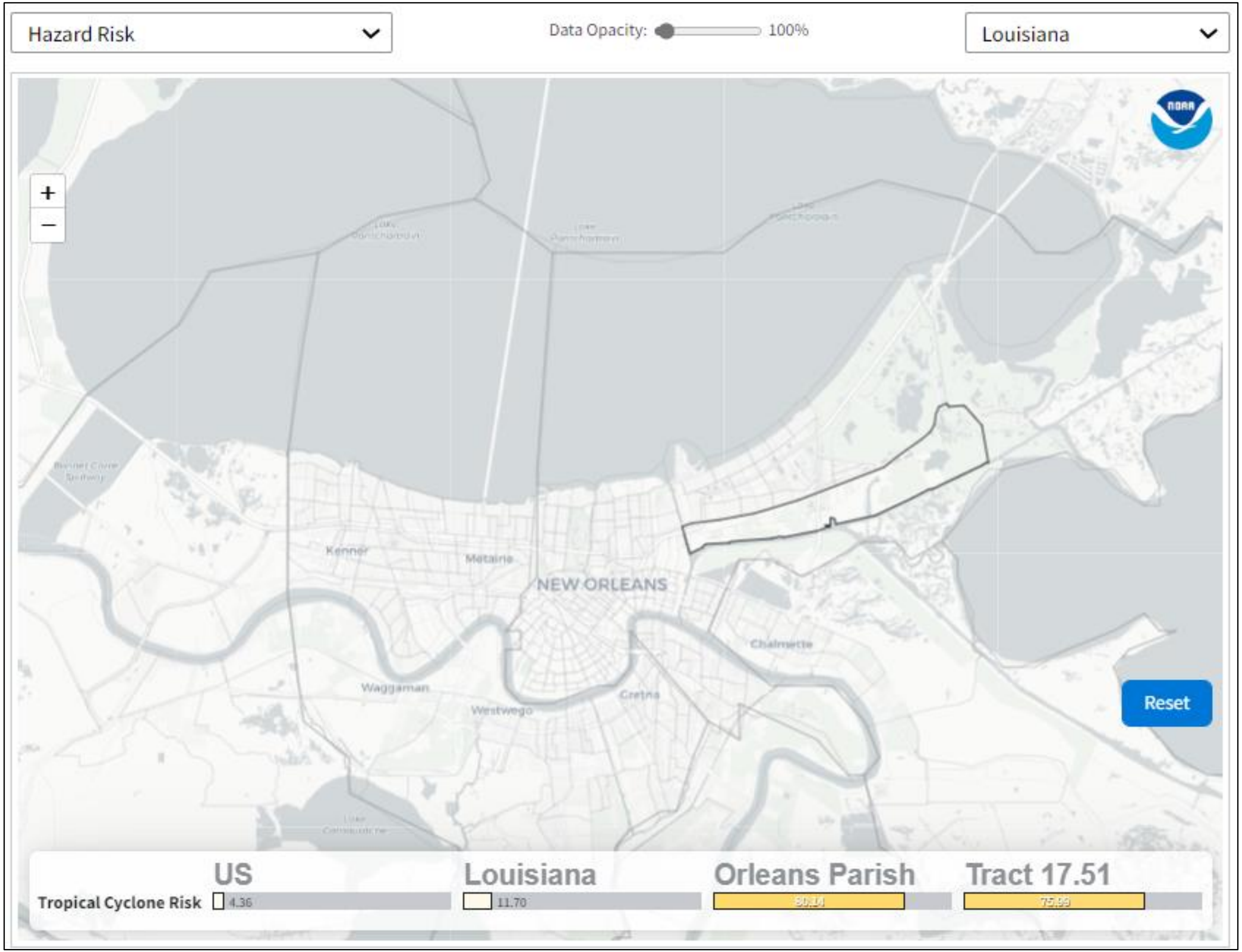
Socioeconomic Vulnerabilities	Harris County
Below Poverty (% of Population)	16.20%
Income (Per Capita Income)	$31,901.00
No High School Diploma (% of Population)	19.10%
Age 65+ (% of Population)	9.80%
Age < 18 (% of Population)	26.90%
Disabled Population (% of Population)	9.20%
Single Parent Households (% of Population)	11.40%
Minority Population (% of Population)	69.90%
English Spoken "Less Than Well" (% of Population)	11.70%
Mobile Homes (% of Homes)	2.50%
No Vehicle (% of Households)	6.00%


Overview
Disaster and Risk Mapping
Time Series
Climatology
Summary Stats
Events
FAQ
References
All Disasters
Drought
Flooding
Freeze
Severe Storm
Tropical Cyclone
Wildfire
Winter Storm
Update
Below Poverty
Mobile Homes
Mobile Homes
Reset
% of Homes
0
50
United States
Georgia
Taylor County
Below Poverty
Mobile Homes
26.30%
37.60%

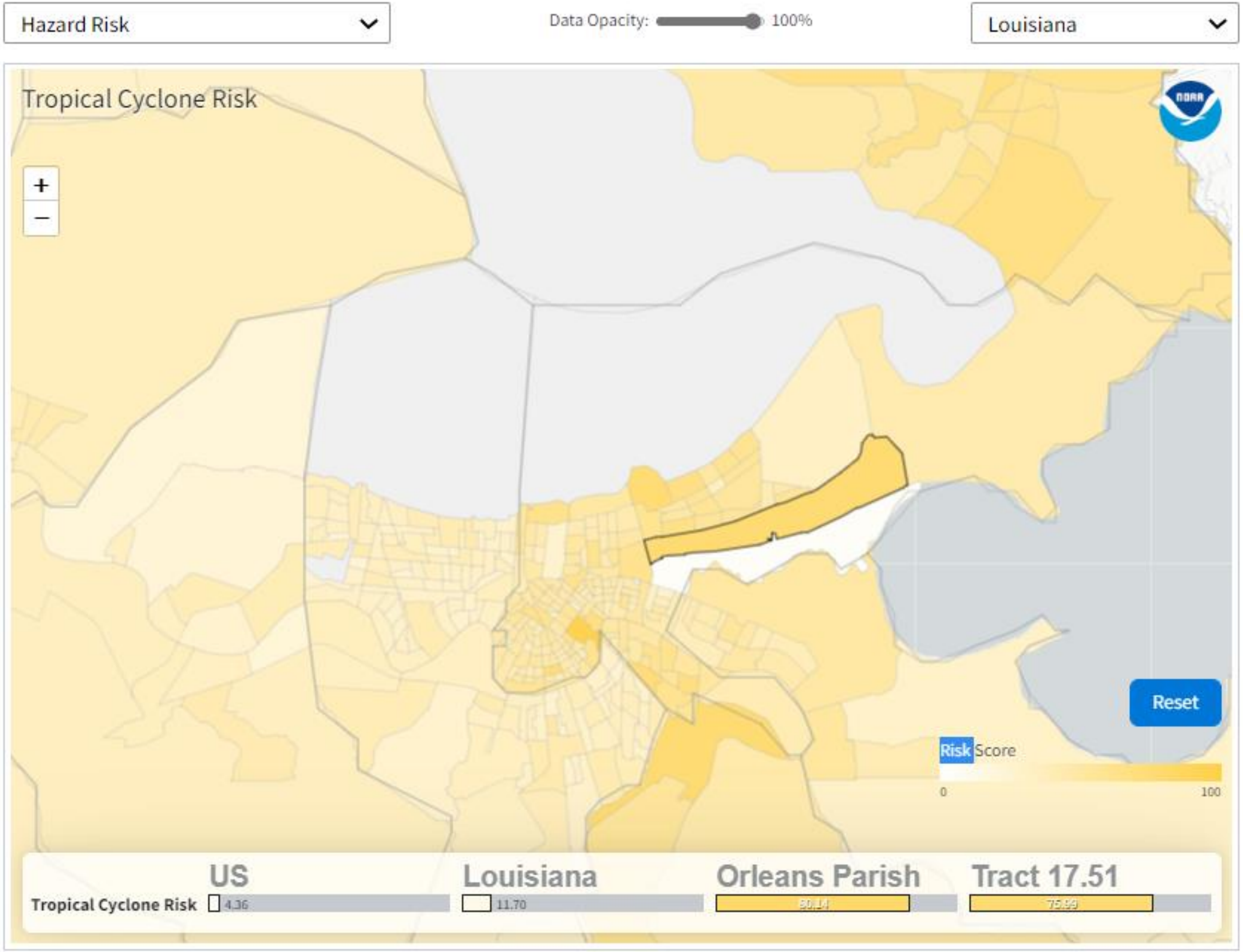

Overview
Disaster and Risk Mapping
Time Series
Climatology
Summary Stats
Events
FAQ
References
All Disasters
Drought
Flooding
Freeze
Severe Storm
Tropical Cyclone
Wildfire
Winter Storm
Update
Below Poverty
Mobile Homes
Population Below Poverty
Reset
% of Population
0
50
United States
Alabama
Perry County
Below Poverty
Mobile Homes
41.80%
20.60%


Hazard Risk
Data Opacity:
100%
Louisiana
MISSISSIPPI
SHREVEP
Tyler
JACKSON
MONTGOM
Nacogdoches
Lufkin
Hattiesburg
Mobile
Biloxi
Pensacola
Beaumont
HOUSTON
Galveston
Reset
Risk Score
0
100
US
Louisiana
Plaquemines Parish
Tract 504
Tropical Cyclone Risk
4.36
11.70
13.75
55.92


Hazard Risk
Data Opacity: 100%
Louisiana
MISSISSIPPI
SHREVEP
Tyler
JACKSON
MONTGOM
Nacogdoches
Lufkin
Hattiesburg
Mobile
Biloxi
Pensacola
Beaumont
HOUSTON
Galveston
Reset
Risk Score
0
100
US
Louisiana
Plaquemines Parish
Tract 504
Tropical Cyclone Risk
4.36
11.70
13.75
55.92

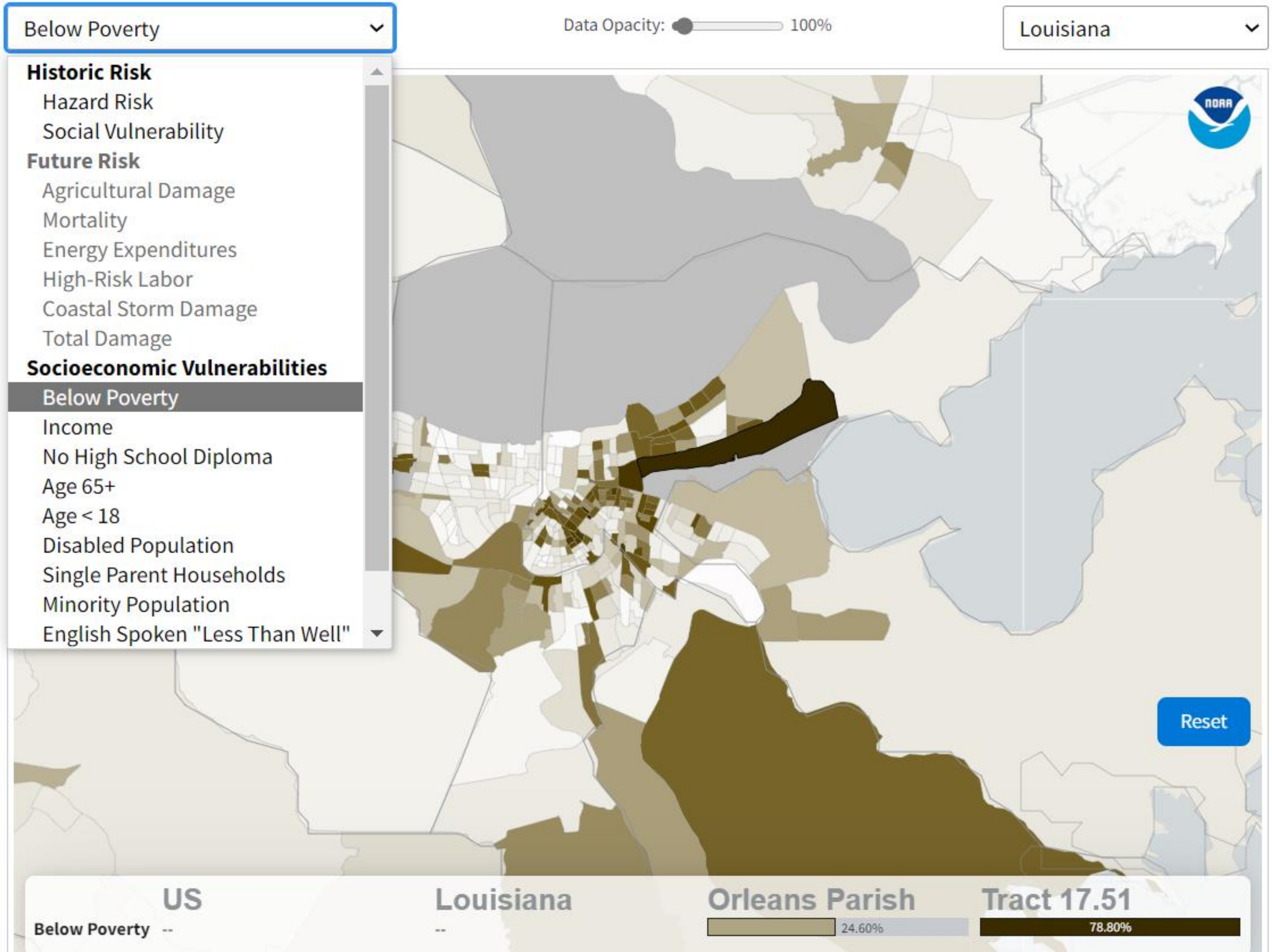


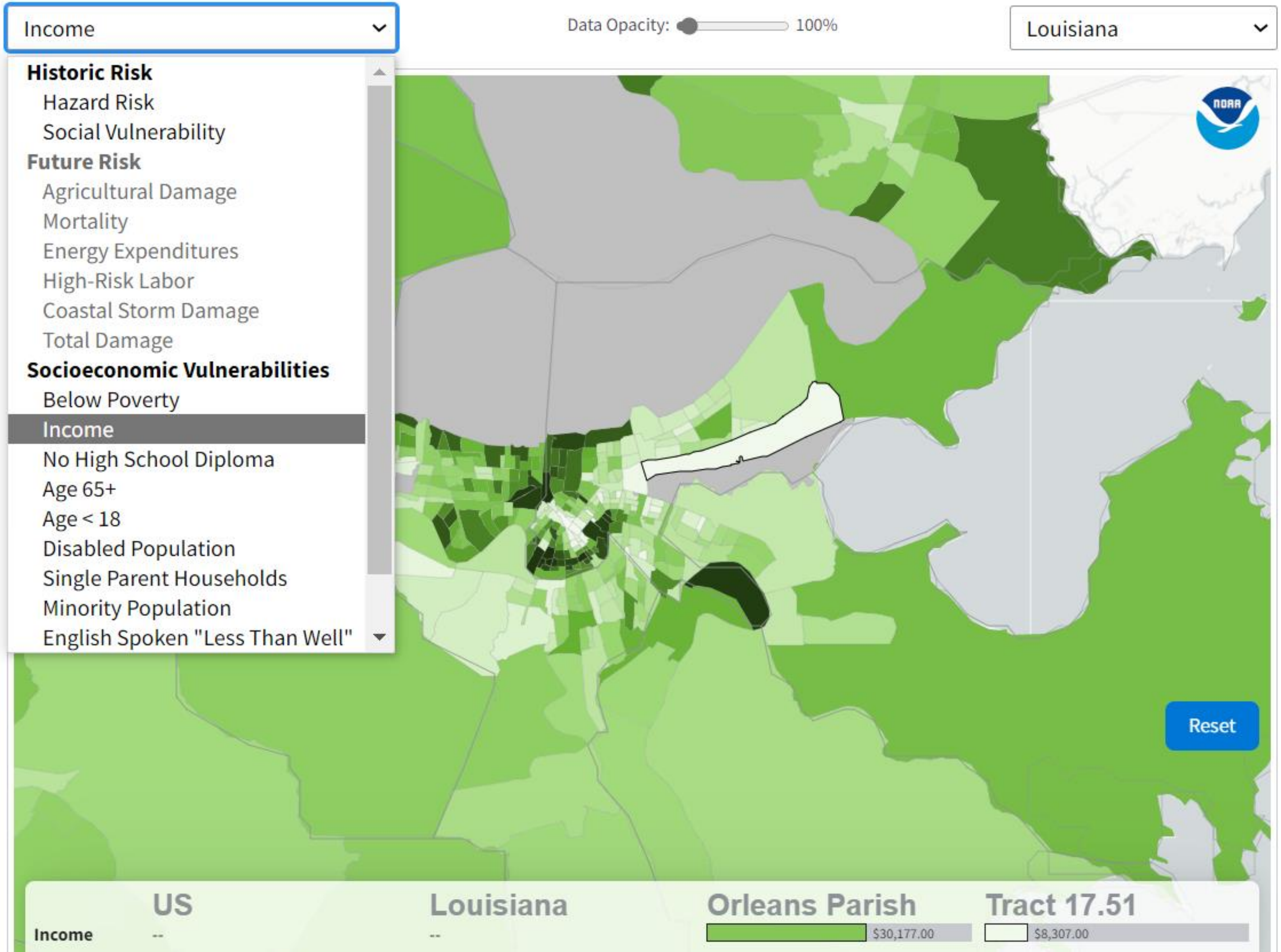
Hazard Risk
Data Opacity:
100%
Louisiana
Kenner
Metairie
NEW ORLEANS
Chalmette
Waggaman
Westwego
Gretna
Reset
US
Louisiana
Orleans Parish
Tract 17.51
Tropical Cyclone Risk
4.36
11.70

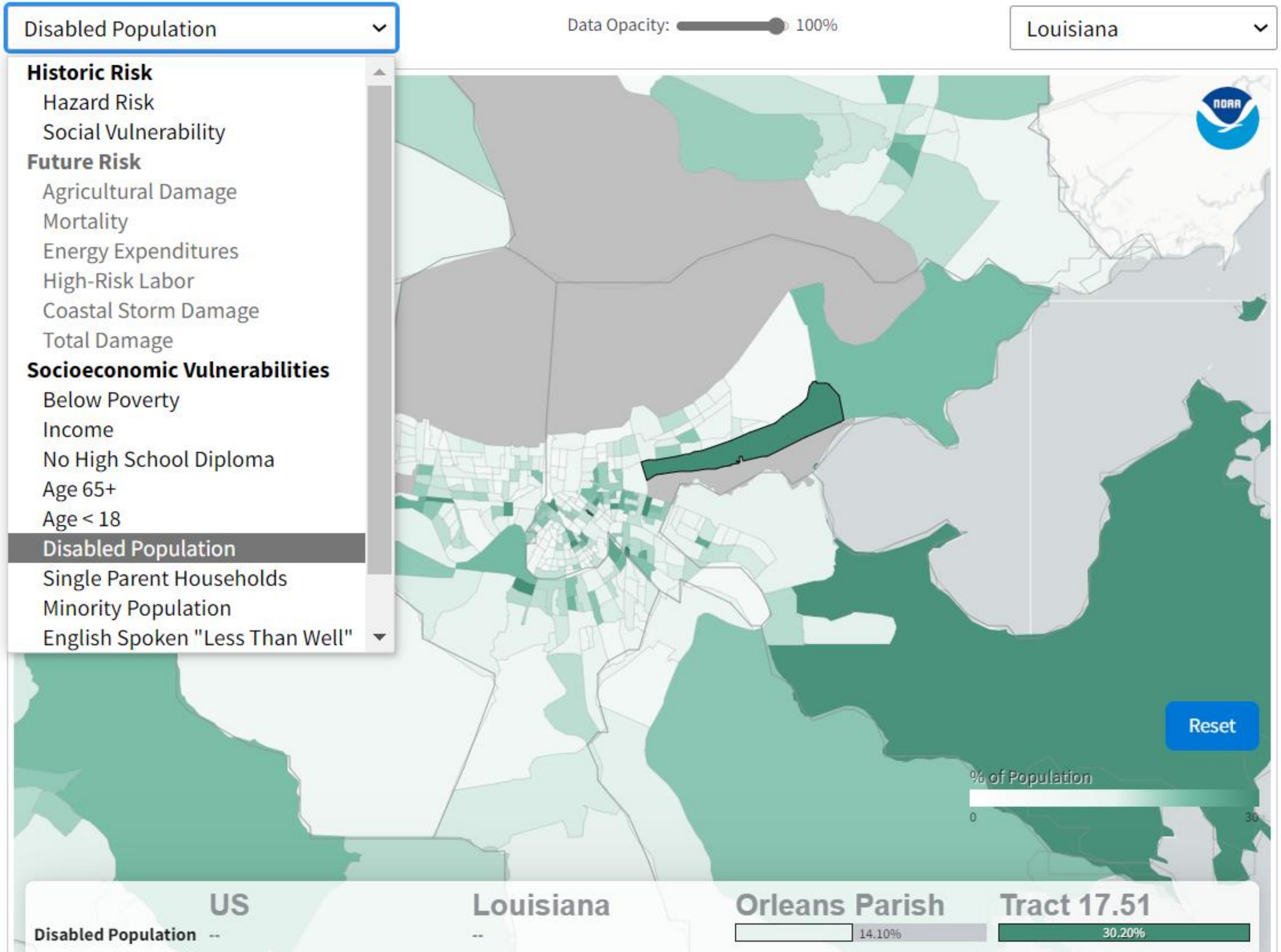


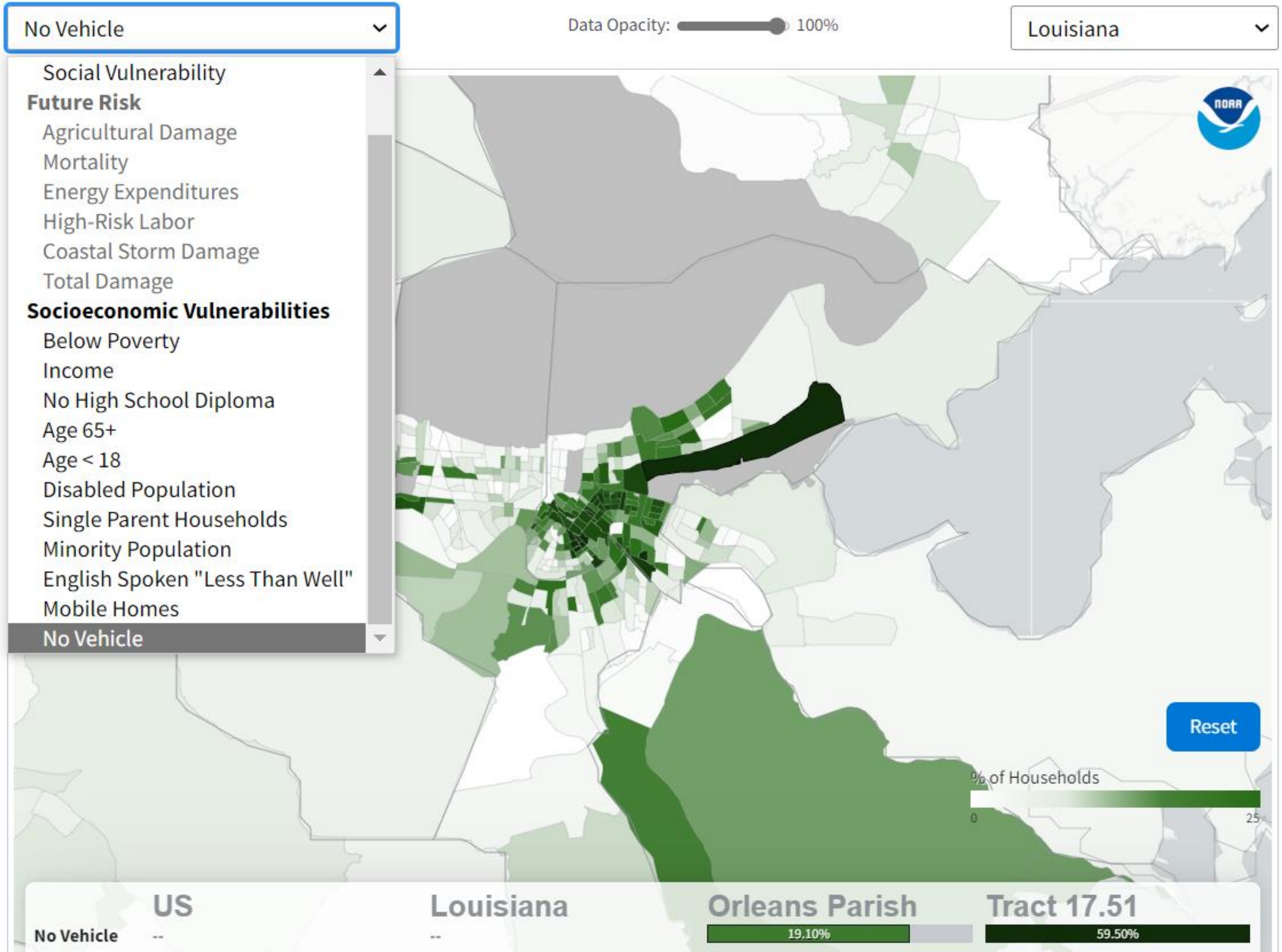
New Orleans metro area –
hurricane hazard risk below map for:

- all U.S.,
- Louisiana,
- Orleans Parish,
- census tract 17.51


Below Poverty
Data Opacity: 100%
Louisiana
Historic Risk
Hazard Risk
Social Vulnerability
Future Risk
Agricultural Damage
Mortality
Energy Expenditures
High-Risk Labor
Coastal Storm Damage
Total Damage
Socioeconomic Vulnerabilities
Below Poverty
Income
No High School Diploma
Age 65+
Age < 18
Disabled Population
Single Parent Households
Minority Population
English Spoken "Less Than Well"
Reset
US
Louisiana
Orleans Parish
Tract 17.51
Below Poverty --
--
24.60%
78.80%


Income
Data Opacity:
100%
Louisiana
Historic Risk
Hazard Risk
Social Vulnerability
Future Risk
Agricultural Damage
Mortality
Energy Expenditures
High-Risk Labor
Coastal Storm Damage
Total Damage
Socioeconomic Vulnerabilities
Below Poverty
Income
No High School Diploma
Age 65+
Age < 18
Disabled Population
Single Parent Households
Minority Population
English Spoken "Less Than Well"
Reset
US
Louisiana
Orleans Parish
Tract 17.51
Income
--
--
$30,177.00
$8,307.00


Disabled Population
Data Opacity: 100%
Louisiana
Historic Risk
Hazard Risk
Social Vulnerability
Future Risk
Agricultural Damage
Mortality
Energy Expenditures
High-Risk Labor
Coastal Storm Damage
Total Damage
Socioeconomic Vulnerabilities
Below Poverty
Income
No High School Diploma
Age 65+
Age < 18
Disabled Population
Single Parent Households
Minority Population
English Spoken "Less Than Well"
NOAA
Reset
% of Population
0
30
US
Louisiana
Orleans Parish
Tract 17.51
Disabled Population
--
--
14.10%
30.20%


No Vehicle
Data Opacity:
100%
Louisiana
Social Vulnerability
Future Risk
Agricultural Damage
Mortality
Energy Expenditures
High-Risk Labor
Coastal Storm Damage
Total Damage
Socioeconomic Vulnerabilities
Below Poverty
Income
No High School Diploma
Age 65+
Age < 18
Disabled Population
Single Parent Households
Minority Population
English Spoken "Less Than Well"
Mobile Homes
No Vehicle
NOAA
Reset
% of Households
0
25
US
Louisiana
Orleans Parish
Tract 17.51
No Vehicle
--
--
19.10%
59.50%

Wide variety of uses of these NOAA Disaster Data Products



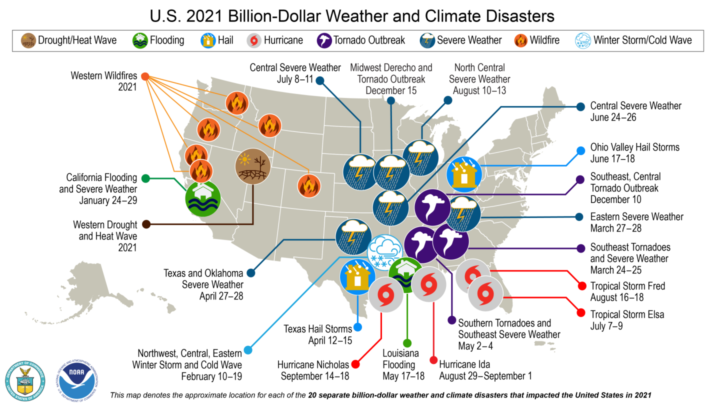


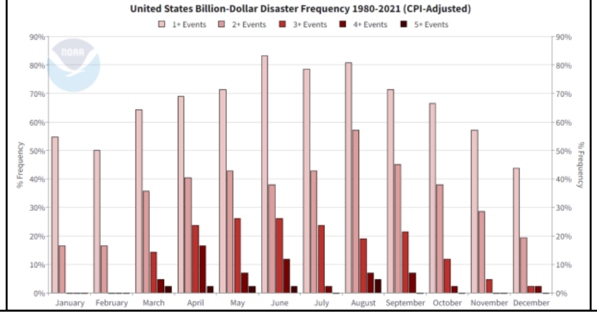

- Support high-level climate assessments (e.g., **IPCC reports, U.S. National Climate Assessment, U.S. Global Change Research Program (USGCRP) Indicators, U.S. & WMO State of the Climate annual reports**)
- **Reinsurance, Insurance, Finance, Agriculture, Emergency Management** (e.g., 'Managing Climate Risk in the U.S. Financial System' (2020));
- **World Economic Forum** Global Risk Report;
- The **White House reports,** Congressional committee documents and reports;
- **Academic research** studies
- **Congressional** and other **report** data **requests**

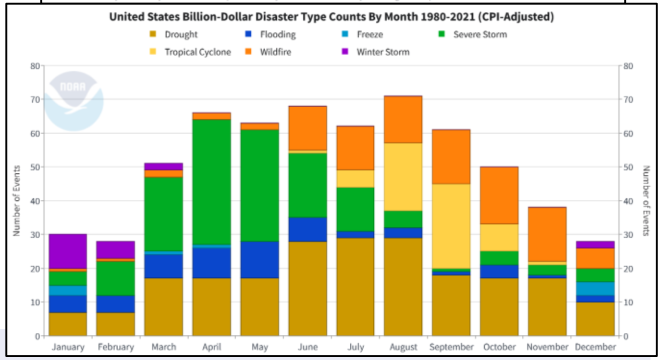
Adam.Smith@noaa.gov

For interactive data, charts, mapping, and disaster summaries (1980-2021):

www.ncei.noaa.gov/access/billions







New county & census tract risk mapping:

www.ncei.noaa.gov/access/billions/mapping

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

NOAA National Centers for Environmental Information (NCEI) U.S. Billion-Dollar Weather and Climate Disasters (2022). https://www.ncdc.noaa.gov/billions/, DOI: 10.25921/stkw-7w73

Smith, A., and R. Katz, 2013: U.S. Billion-dollar Weather and Climate Disasters: Data Sources, Trends, Accuracy and Biases. Natural Hazards., DOI: 10.1007/s11069-013-0566-5

Smith, A., and J. Matthews, 2015: Quantifying Uncertainty and Variable Sensitivity within the U.S. Billion-dollar Weather and Climate Disaster Cost Estimates. Natural Hazards., DOI: 10.1007/s11069-015-1678-x

Zuzak, C., E. Goodenough, C. Stanton, M. Mowrer, N. Ranalli, D. Kealey, and J. Rozelle. 2021. National Risk Index Technical Documentation (fema.gov). Federal Emergency Management Agency, Washington, DC.

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