NOAA tool now brings disaster risk, vulnerability down to community level




Integrating hazard risk and socioeconomic vulnerability within U.S. Billion-dollar disasters platform with FEMA, Census and CDC census tract data

Adam B. Smith, Applied Climatologist

NOAA National Centers for Environmental Information (NCEI)

Climate Science and Services Division

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

Climate Science and Service Division





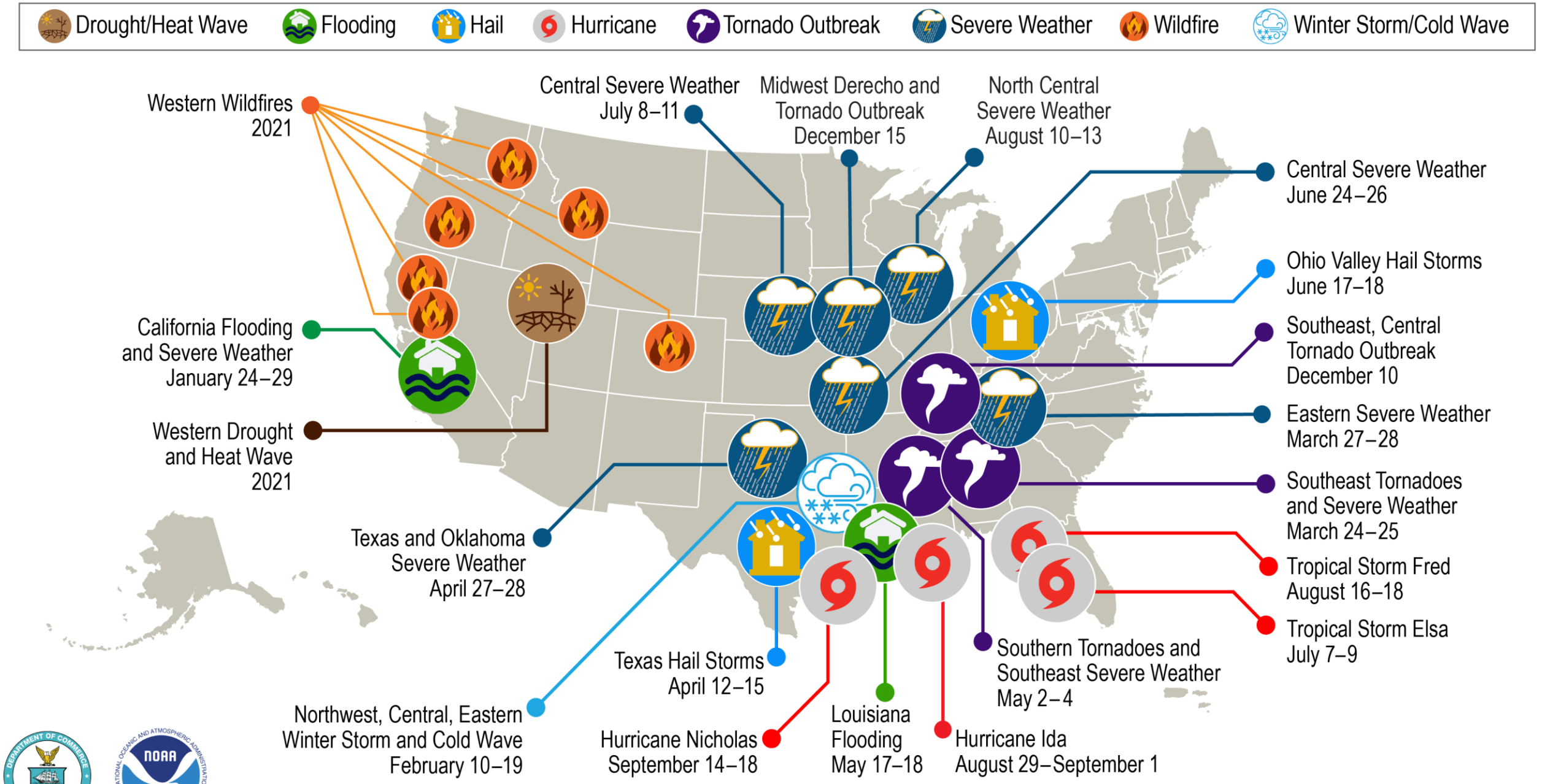

Statutory mission to describe the climate of the United States and act as the **"Nation's Scorekeeper" regarding the trends and anomalies** of weather and climate.

- 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.

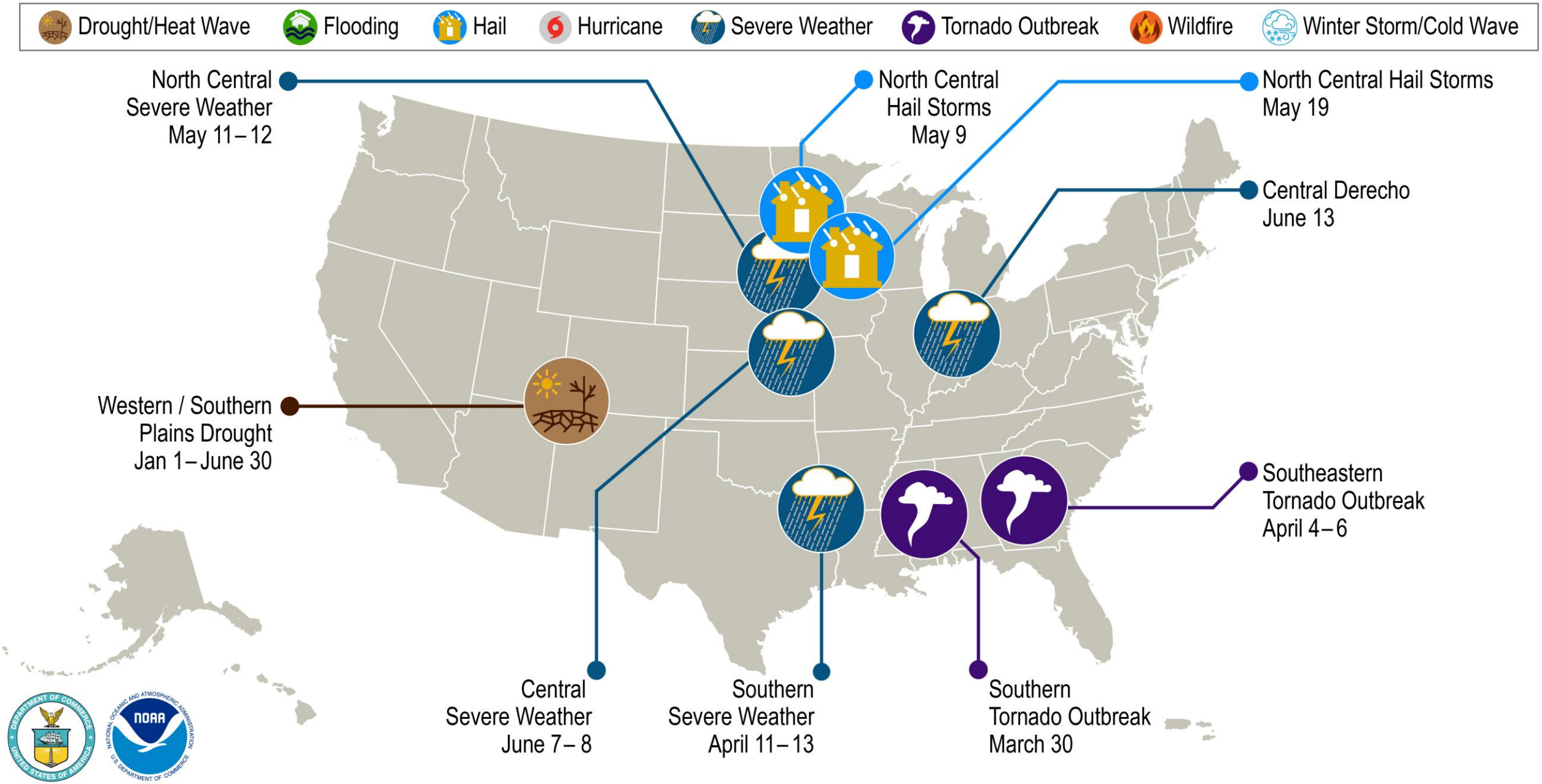
- **Period of record: 1980-2022 (Quarterly updates)**
- The U.S. has sustained **332** separate weather and climate disasters since 1980 where overall damages/costs reached or exceeded $1 billion.
- **Total, direct costs exceed $2.275 trillion (CPI-adjusted to 2022).**

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. 2022 Billion-Dollar Weather and Climate Disasters



*This map denotes the approximate location for each of the **9 separate billion-dollar weather and climate disasters that impacted the United States January – June of 2022.***

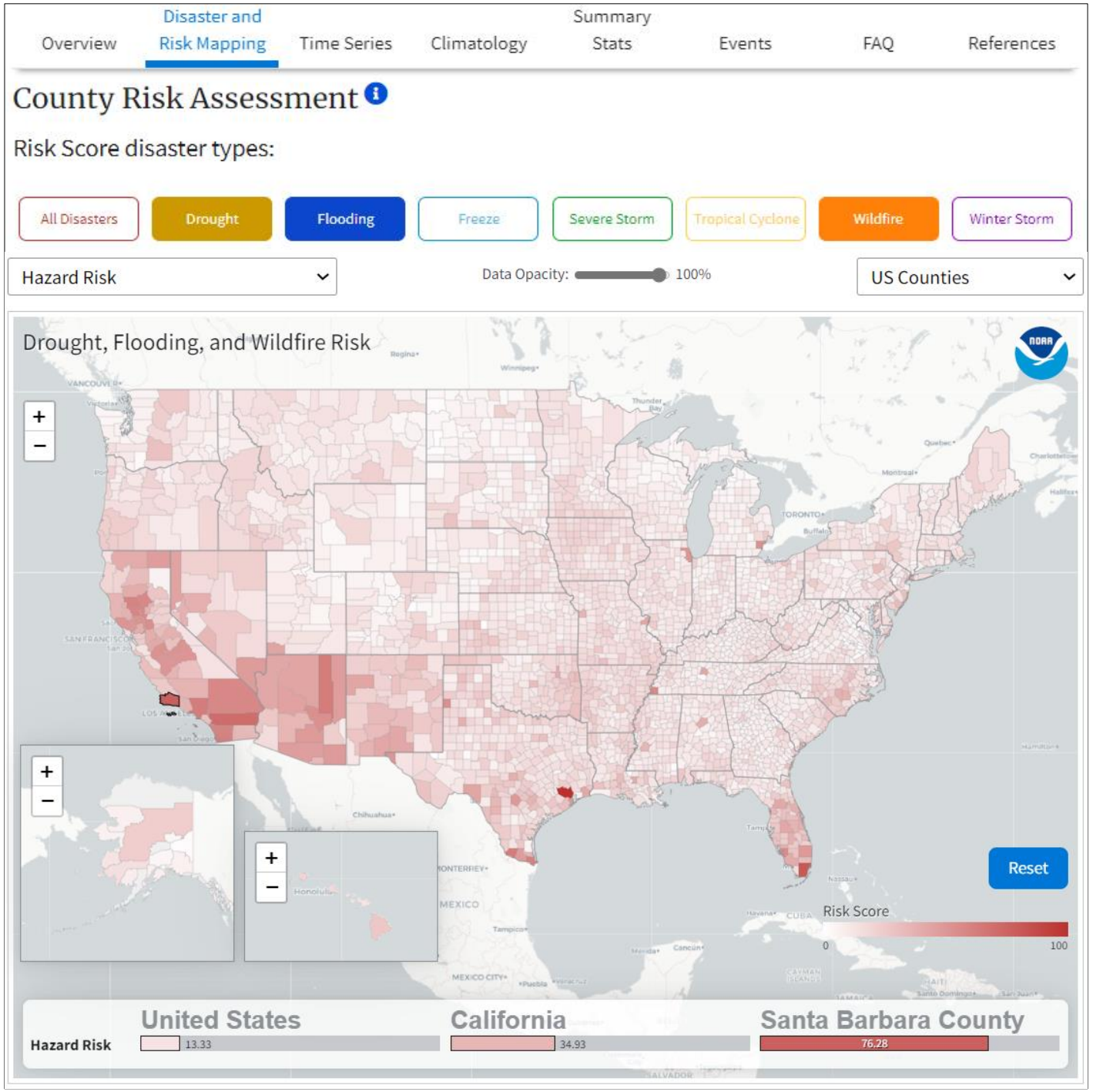
Integrated Multi-hazard, vulnerability mapping

- Integration of FEMA, Census and CDC data products for counties & census tracts according to single or multi-hazard risk:

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

- Maps show the potential to experience weather and climate hazards, combined with a location's exposure and socioeconomic vulnerability.

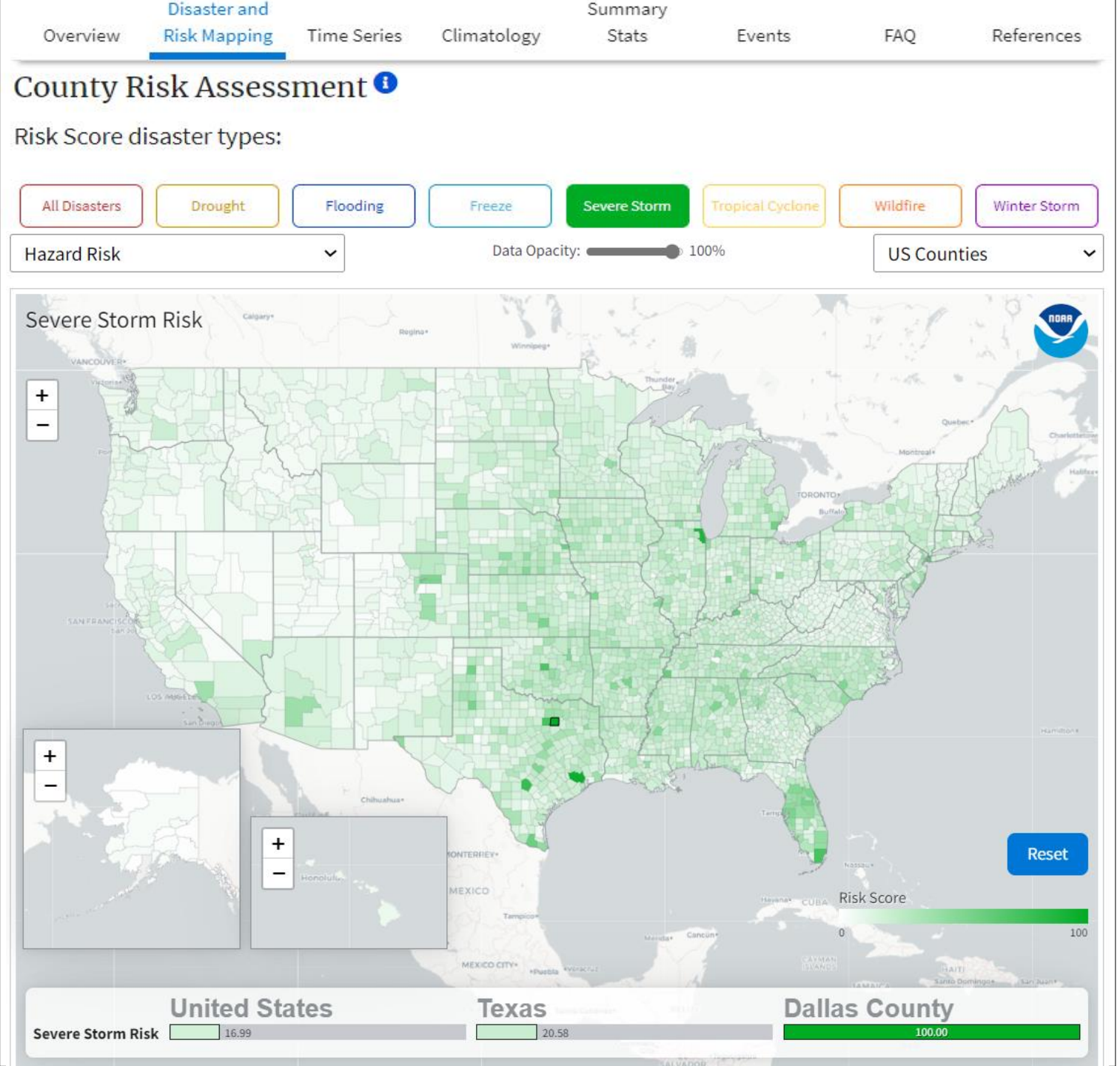
- Incorporated the CDC/ATSDR Social Vulnerability Index for 11 select socioeconomic variables exploring a community's "reduced ability to prepare for, respond to, and recover from hazards"



Compound hazard county risk (Drought, Wildfire and Flooding)

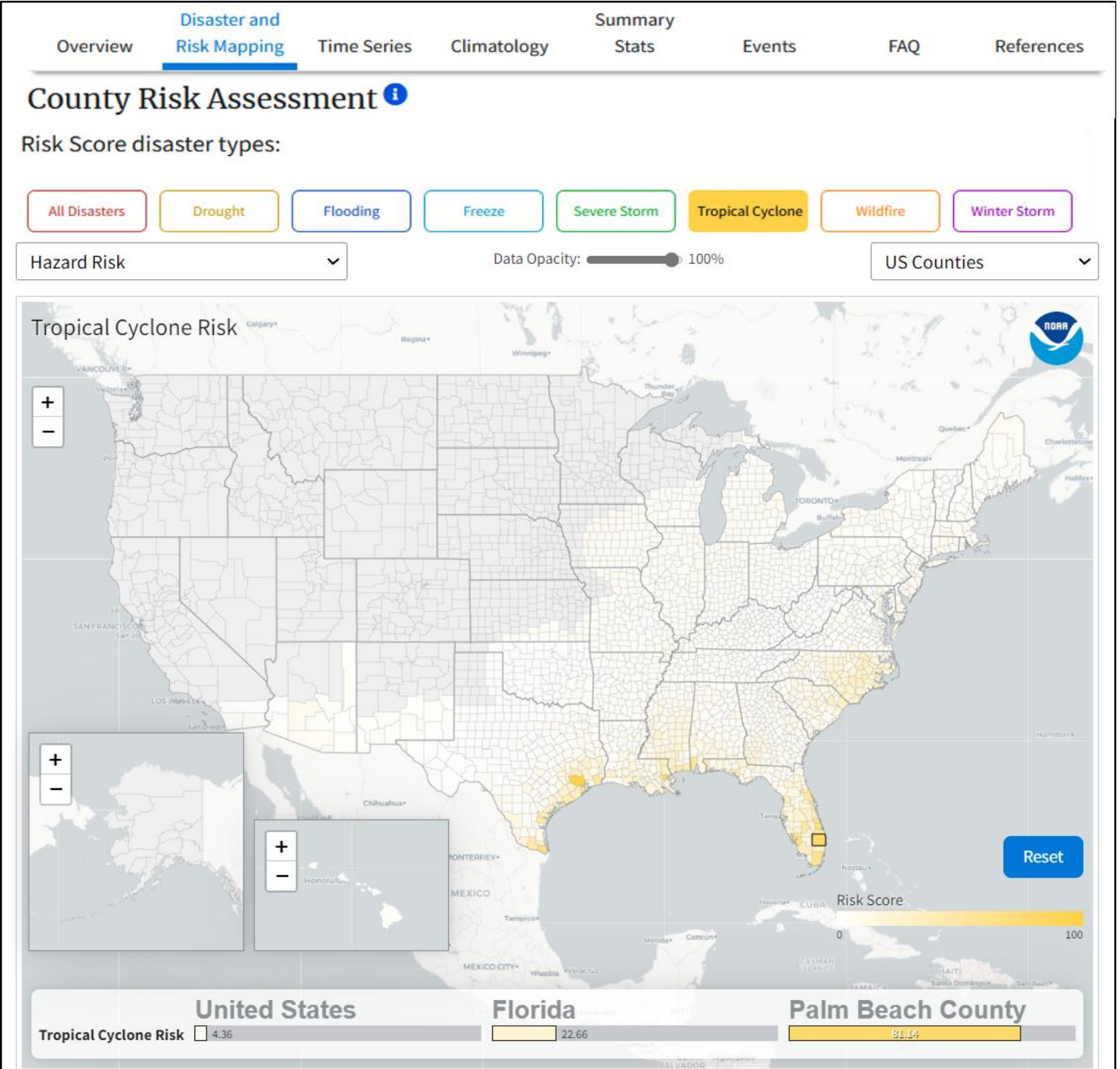
Each region faces **unique hazard combinations, which are useful in <u>a new era of more likely cascading hazard impacts</u>** (i.e., drought-enhanced wildfires produce mountain-side burn scars, which often enhance debris flows from flooding.

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."**



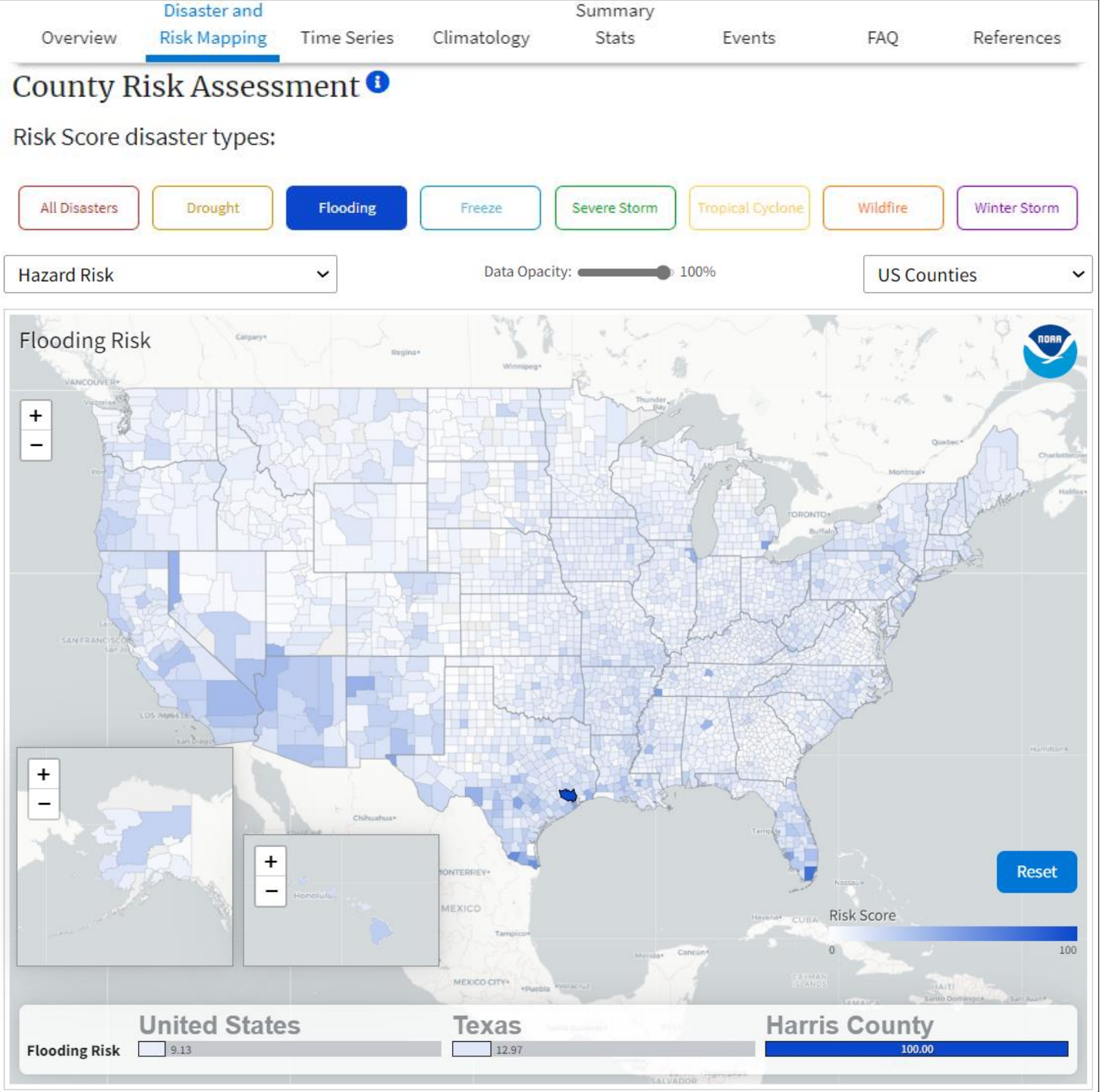
This map provides county risk scores for combined **severe storm events (i.e., tornado, hail, high wind damage)** reflecting a county's annualized hazard frequency; its potential hazard cost related to building value, crop value and population exposure.

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.



Gulf Coast is at a 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** ($1,194.4 billion, CPI-adjusted) and also have the highest average event cost ($21.0 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 damaging urban flood events.

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

Harris County, TX
Risk Assessment

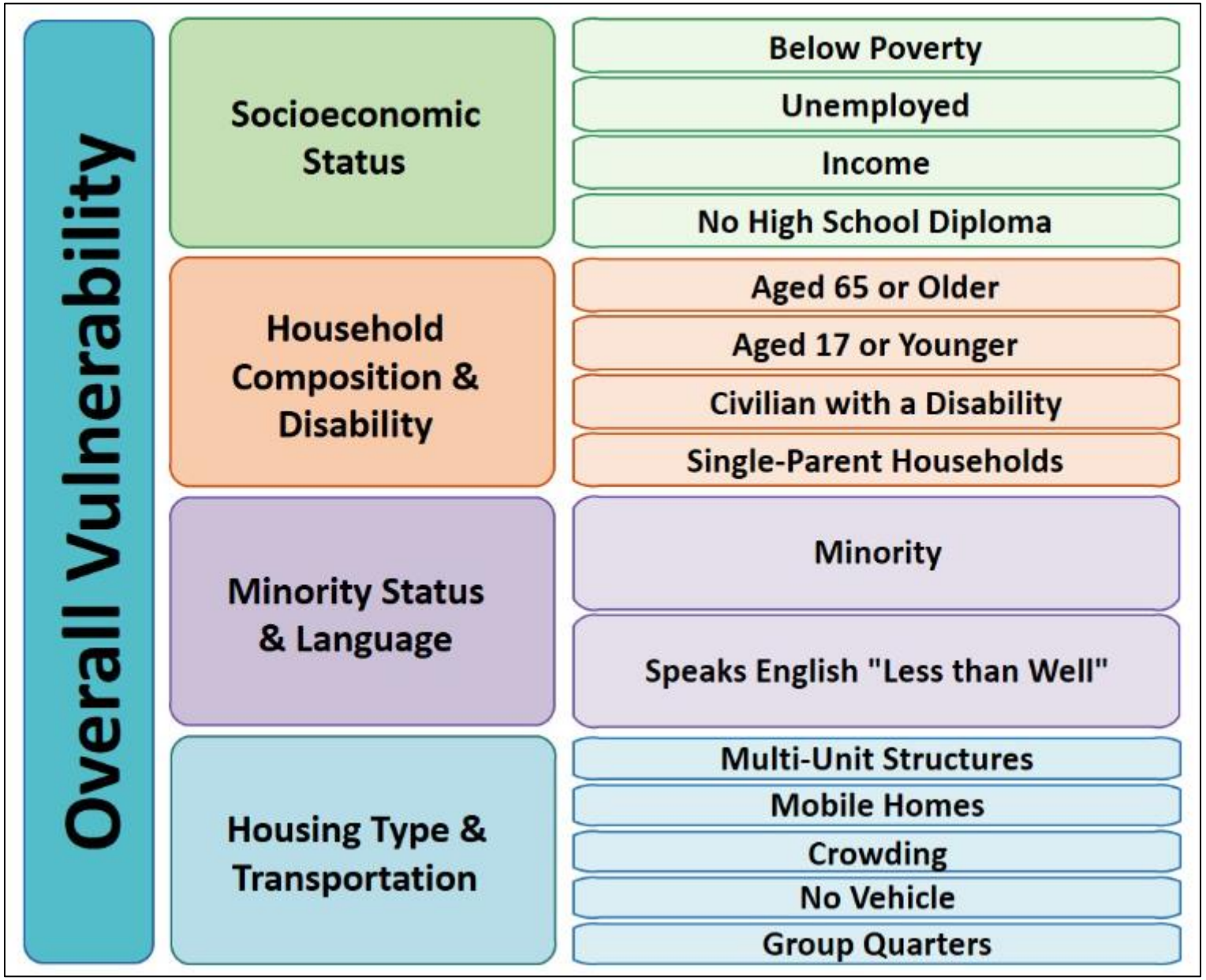
Historic Risk	Harris County	Texas	U.S.
Drought Risk	20.36	14.32	11.61
Flooding Risk	100.00	12.97	9.13
Freeze Risk	12.05	13.09	15.72
Severe Storm Risk	94.56	20.58	16.99
Tropical Cyclone Risk	100.00	8.63	5.74
Wildfire Risk	11.81	11.28	6.30
Winter Storm Risk	65.33	15.99	13.71
Weather and Climate Combined 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



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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%

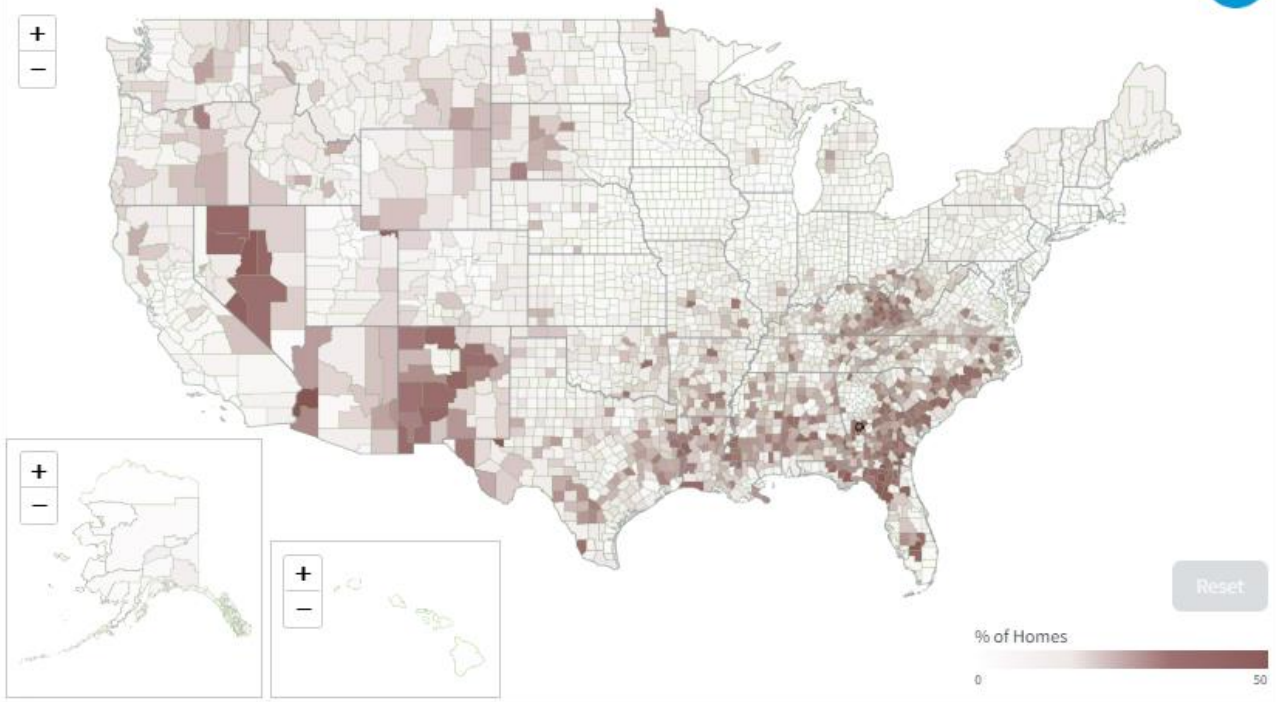
Overview | Disaster and Risk Mapping | Time Series | Climatology | Summary Stats | Events | FAQ | References

All Disasters | Drought | Flooding | Freeze | Severe Storm | Tropical Cyclone | Wildfire | Winter Storm

Update

Below Poverty — Mobile Homes

Mobile Homes



Reset

United States		Georgia		Taylor County	
Below Poverty	--		--		26.30%
Mobile Homes	--		--		37.60%

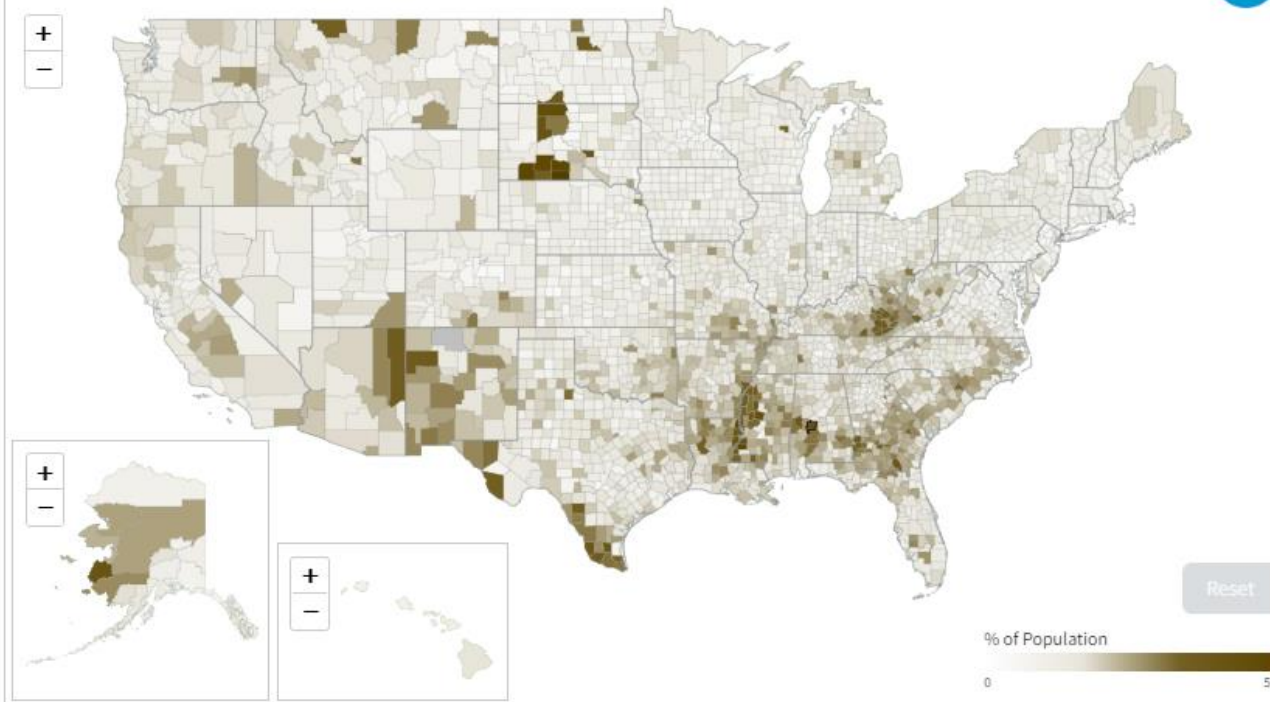
Overview | Disaster and Risk Mapping | Time Series | Climatology | Summary Stats | Events | FAQ | References

All Disasters | Drought | Flooding | Freeze | Severe Storm | Tropical Cyclone | Wildfire | Winter Storm

Update

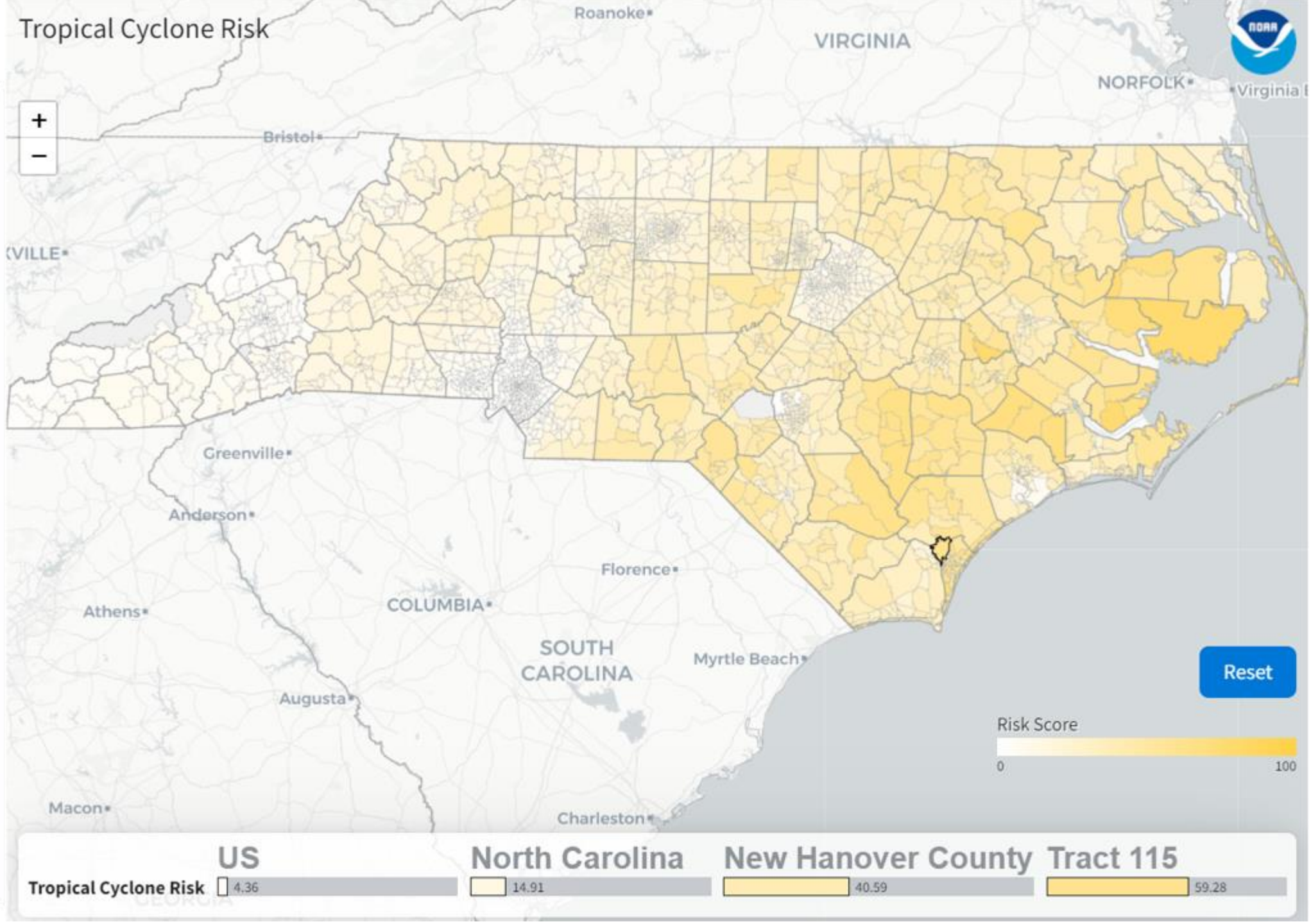
Below Poverty — Mobile Homes

Population Below Poverty



Reset

United States		Alabama		Perry County	
Below Poverty	--		--		41.80%
Mobile Homes	--		--		20.60%

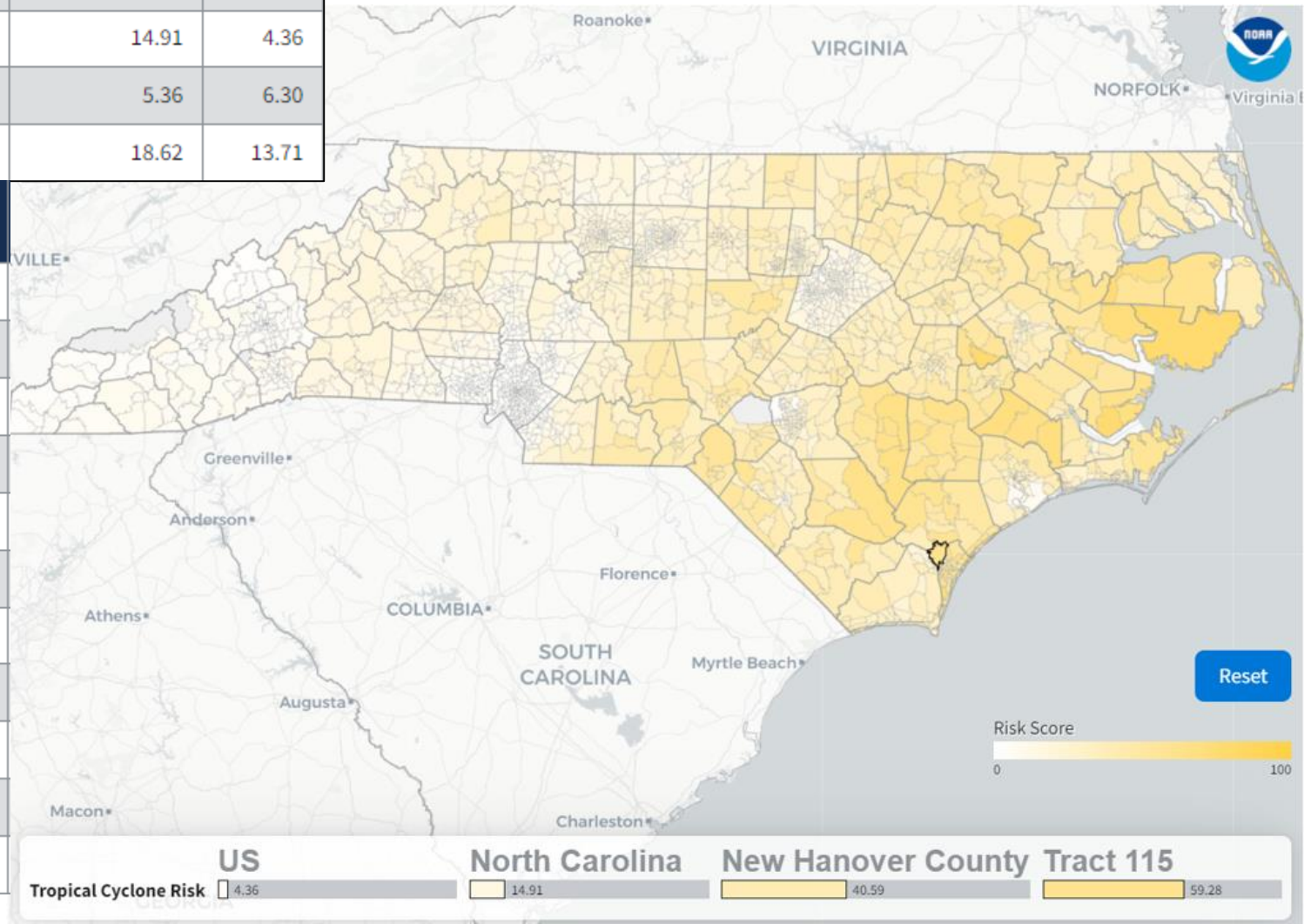


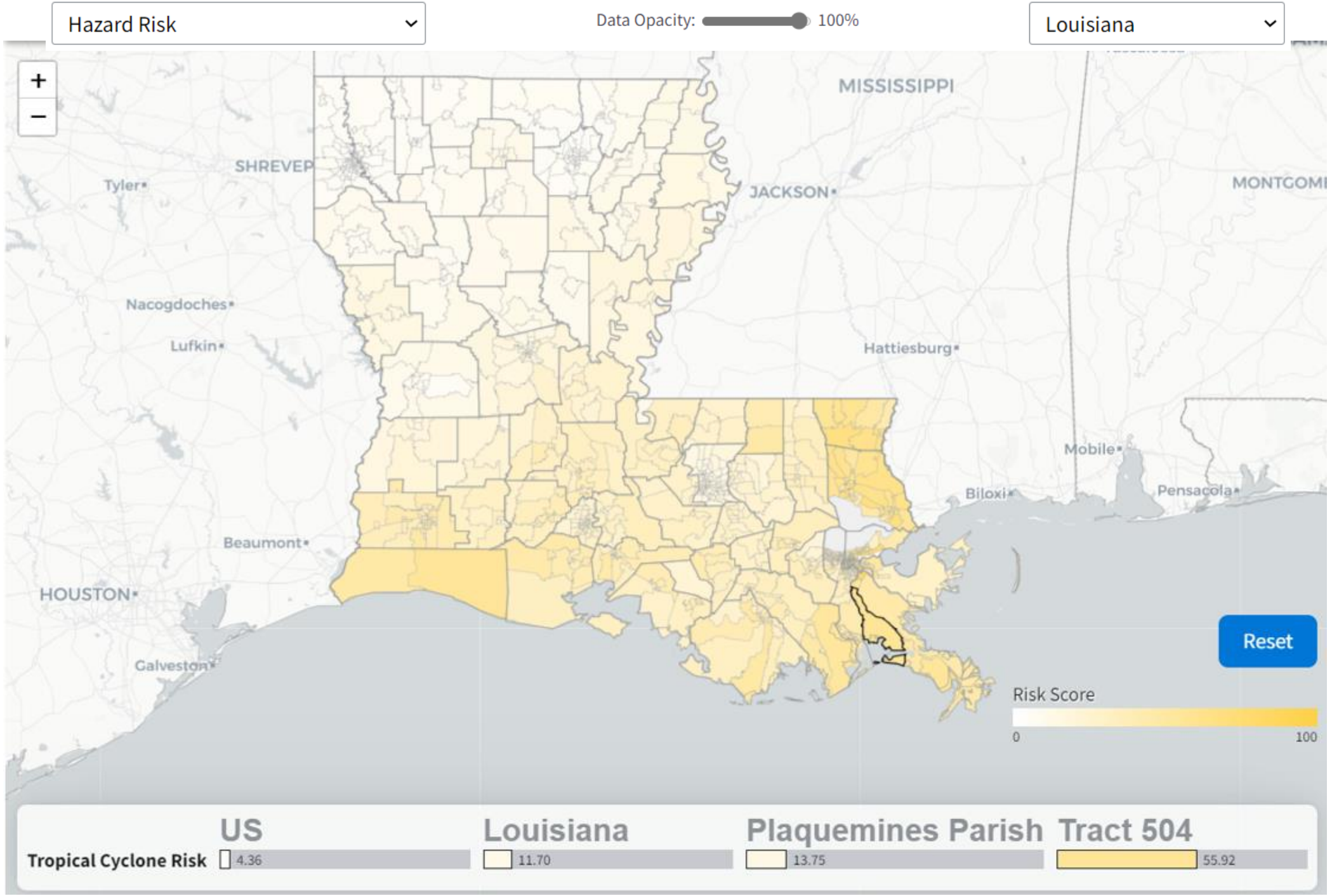
Map of North Carolina <u>divided into U.S. census tracts</u> that show **Tropical Cyclone Risk** in shades of yellow.

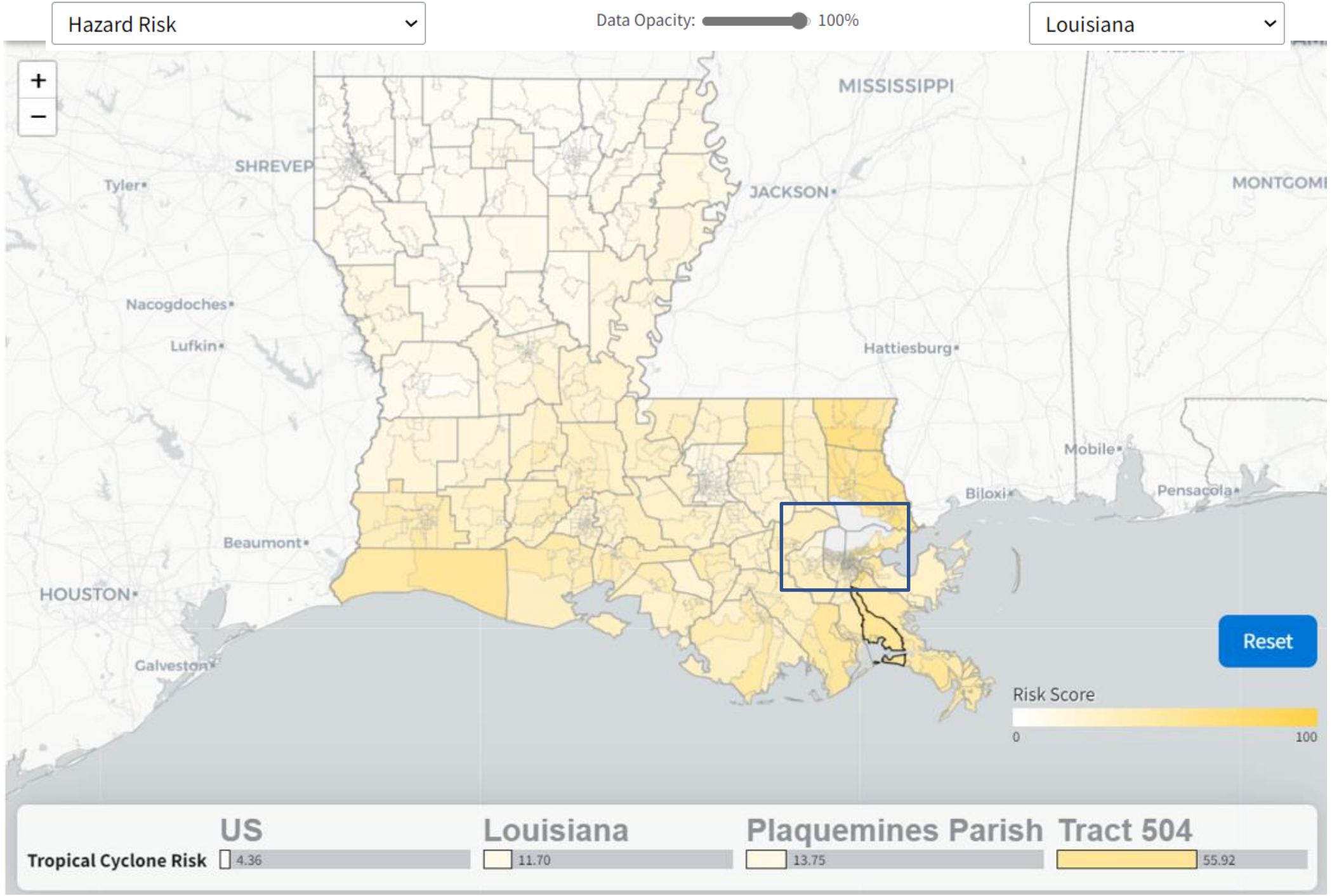
Darker yellow indicates higher risk and is found mostly in coastal tracts, while lighter yellow indicates lower risk and is found more inland.

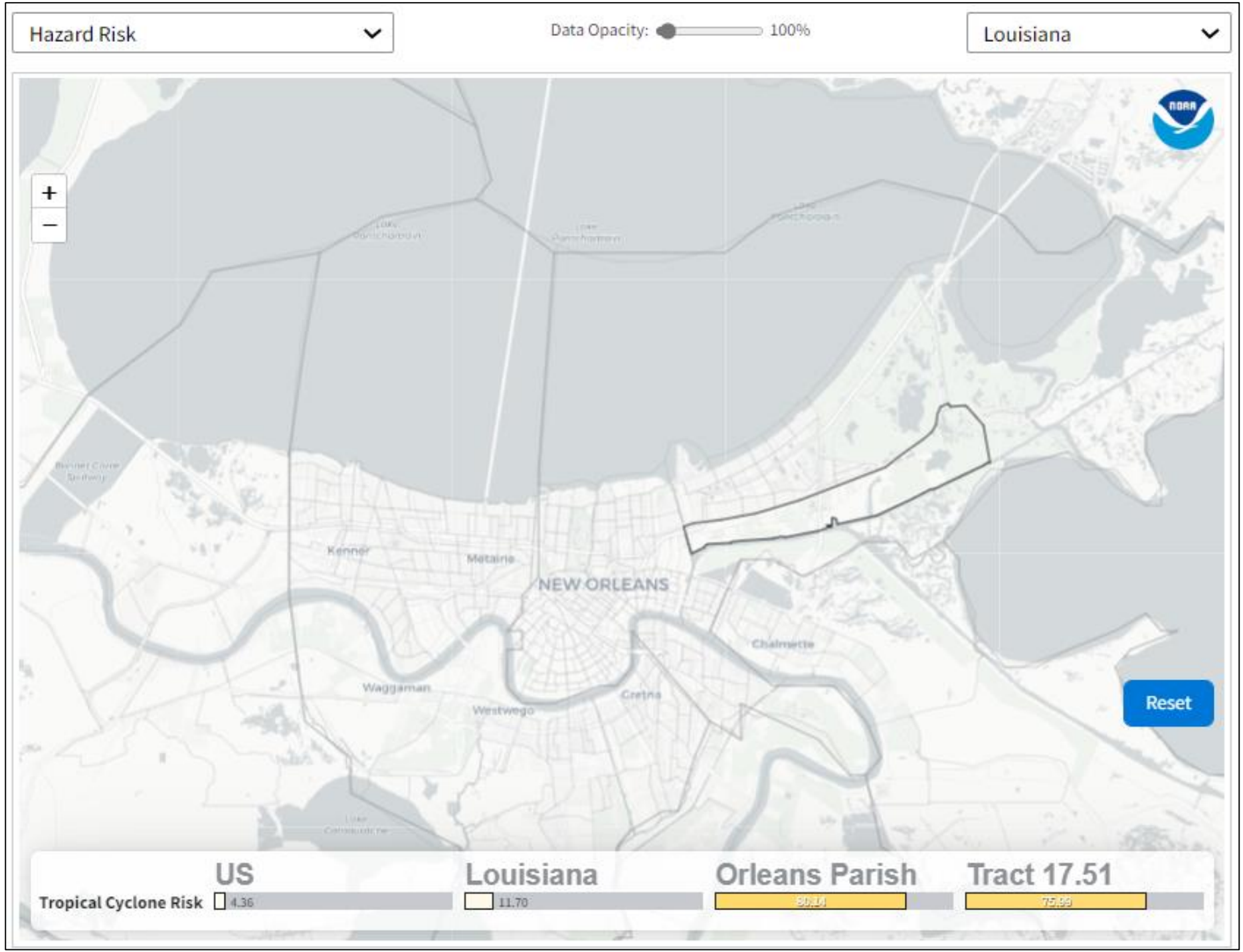
Historic Risk	Census Tract 115	New Hanover County	North Carolina	U.S.
Drought Risk	8.70	15.26	15.44	11.61
Flooding Risk	8.34	8.21	10.84	9.13
Freeze Risk	26.25	28.30	17.31	15.72
Severe Storm Risk	34.88	28.32	21.42	16.99
Tropical Cyclone Risk	59.28	40.59	14.91	4.36
Wildfire Risk	19.20	18.50	5.36	6.30
Winter Storm Risk	20.28	25.17	18.62	13.71

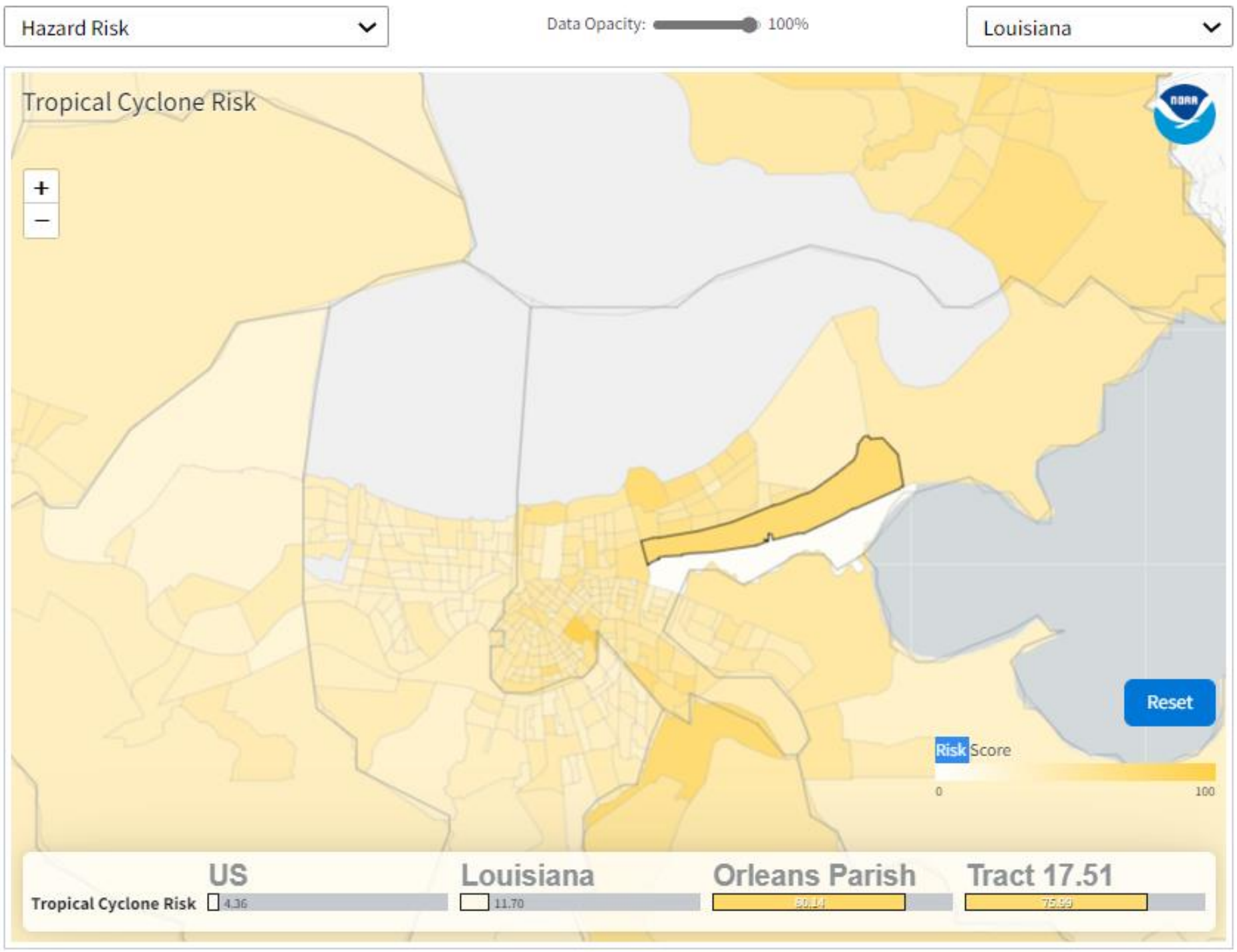
Socioeconomic Vulnerabilities	Census Tract 115	New Hanover County
Below Poverty (% of Population)	14.80%	17.30%
Income (Per Capita Income)	$21,014.00	$32,629.00
No High School Diploma (% of Population)	10.90%	7.10%
Age 65+ (% of Population)	17.60%	16.70%
Age < 18 (% of Population)	16.90%	18.90%
Disabled Population (% of Population)	15.60%	12.70%
Single Parent Households (% of Population)	11.10%	8.10%
Minority Population (% of Population)	29.20%	22.90%
English Spoken "Less Than Well" (% of Population)	1.70%	1.30%
Mobile Homes (% of Homes)	15.20%	4.10%
No Vehicle (% of Households)	3.00%	6.40%




Hazard Risk
Data Opacity:
100%
Louisiana
MISSISSIPPI
SHREVEP
Tyler
JACKSON
MONTGOMI
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

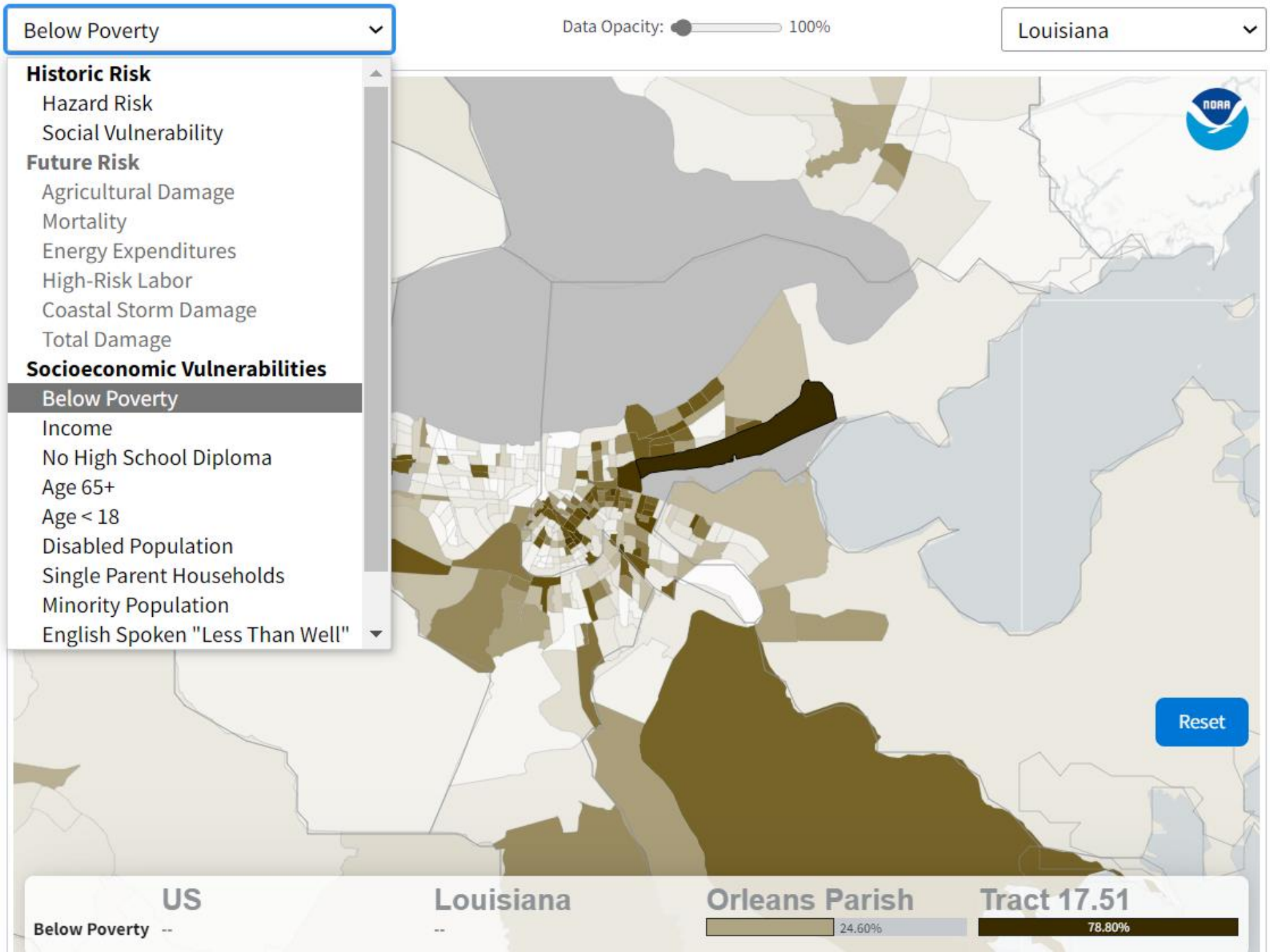

Hazard Risk
Data Opacity:
100%
Louisiana
MISSISSIPPI
SHREVEP
Tyler
JACKSON
MONTGOMI
Nacogdoches
Lufkin
Hattiesburg
Mobile
Biloxi
Pensacola
Beaumont
HOUSTON
Galveston
Reset
Risk Score
0
100
US
Louisiana
Plaquemines Parish
Tract 504
Tropical Cyclone Risk
4.36
11.70
13.75
55.92

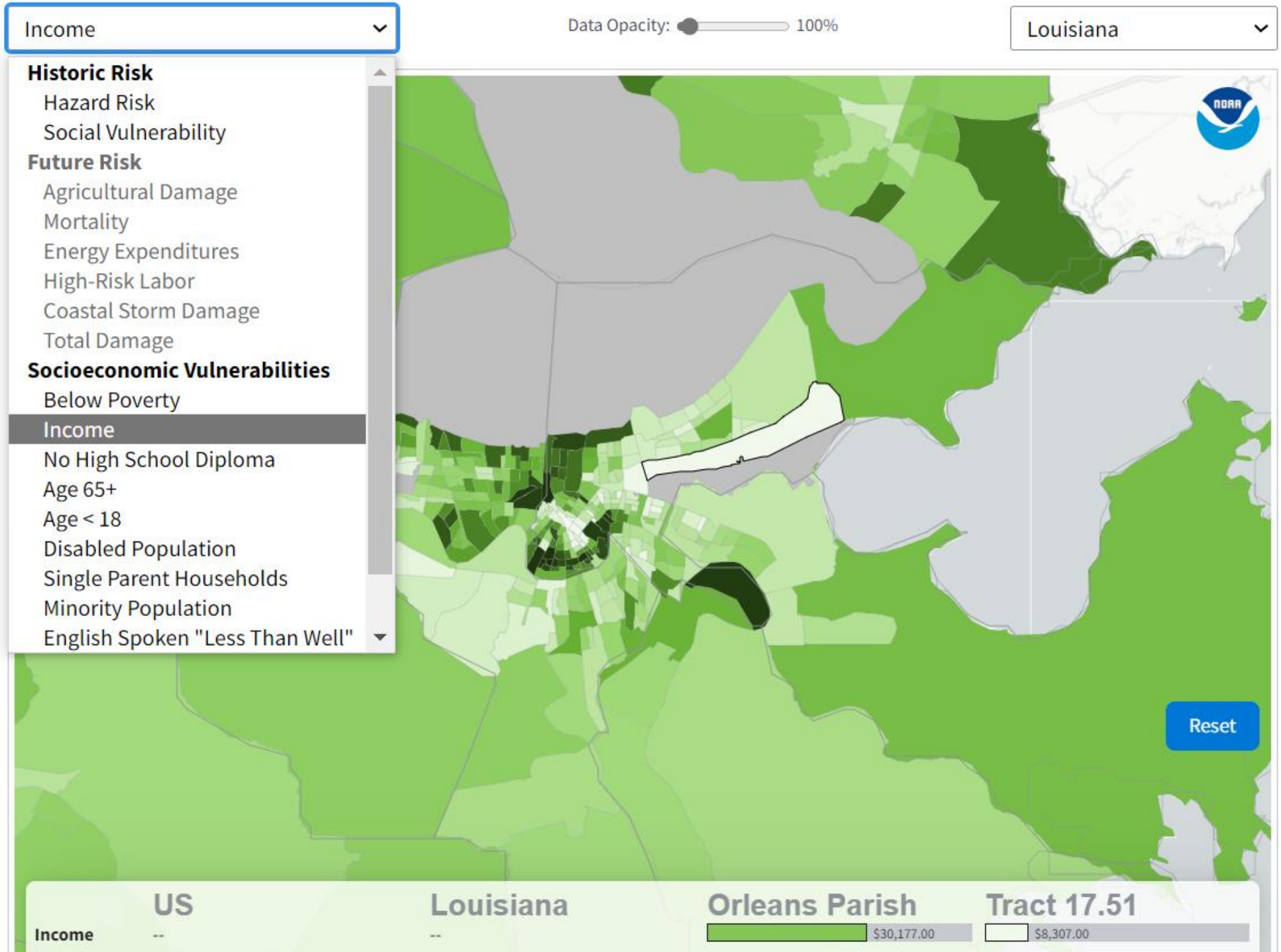

Hazard Risk
Data Opacity:
100%
Louisiana
Kenner
Metairie
NEW ORLEANS
Chalmette
Waggaman
Westwego
Reset
US
Louisiana
Orleans Parish
Tract 17.51
Tropical Cyclone Risk
4.36
11.70



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
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Mortality
Energy Expenditures
High-Risk Labor
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Total Damage
Socioeconomic Vulnerabilities
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Income
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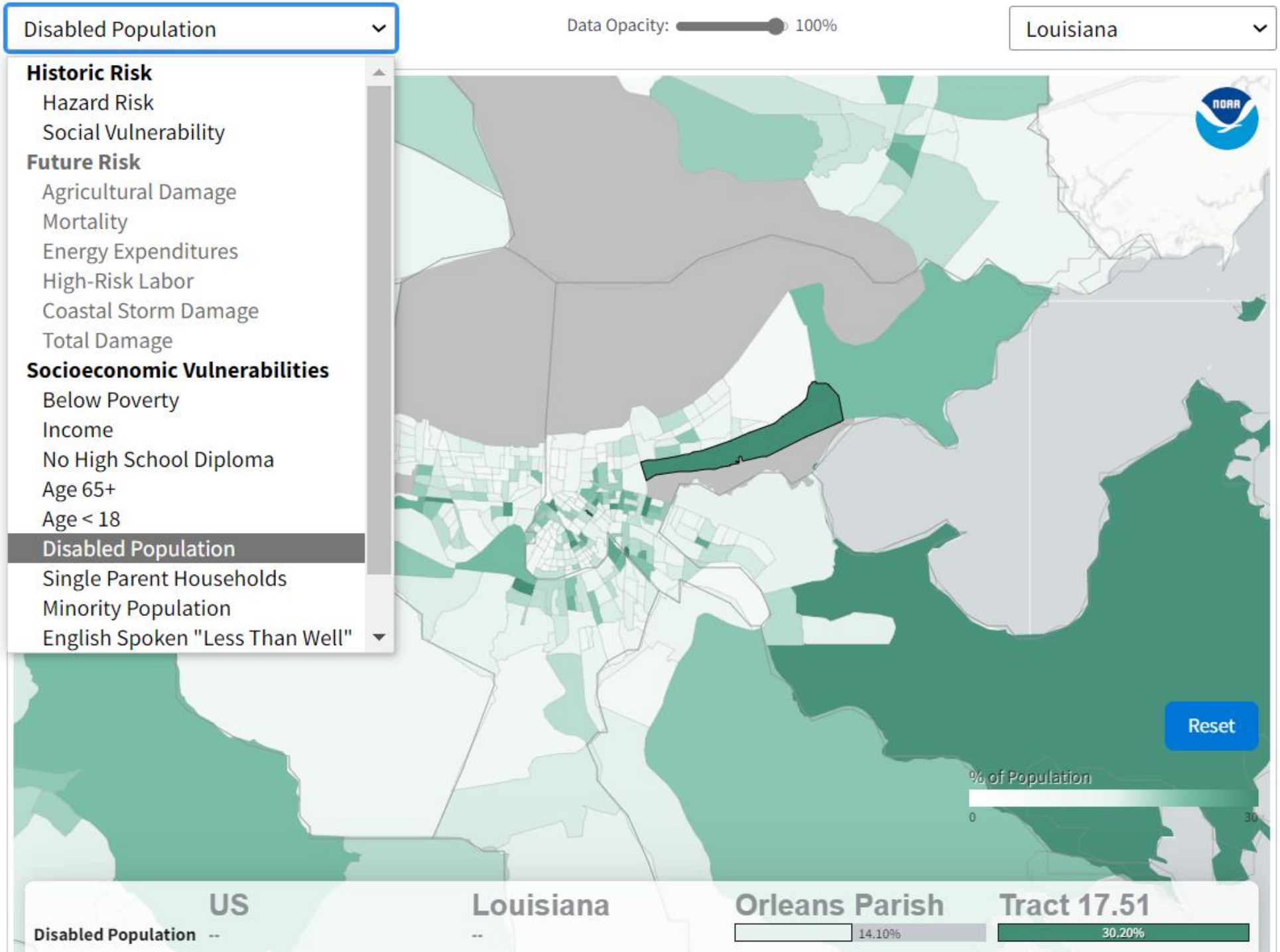
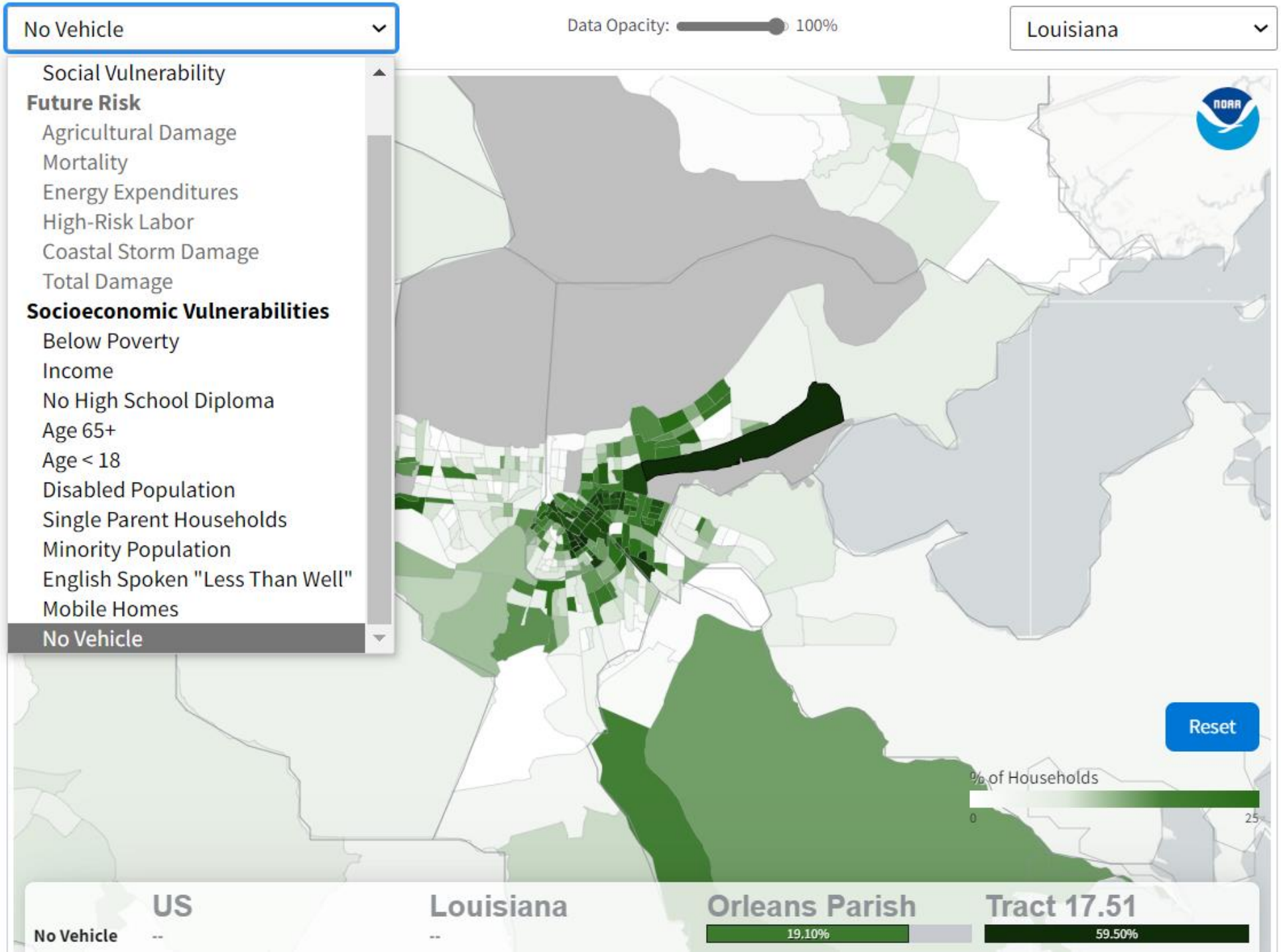
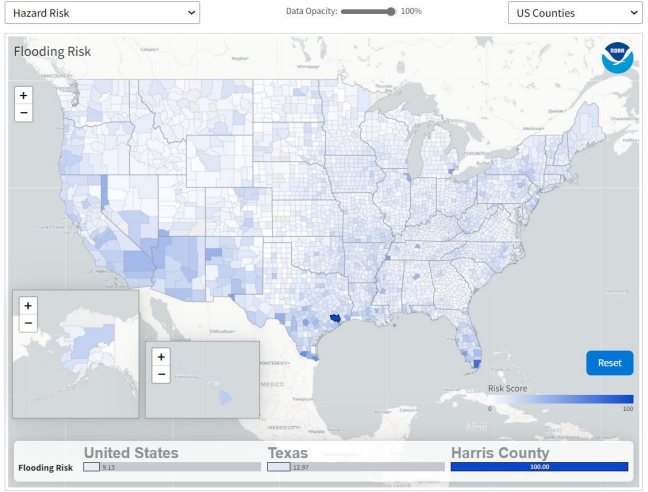
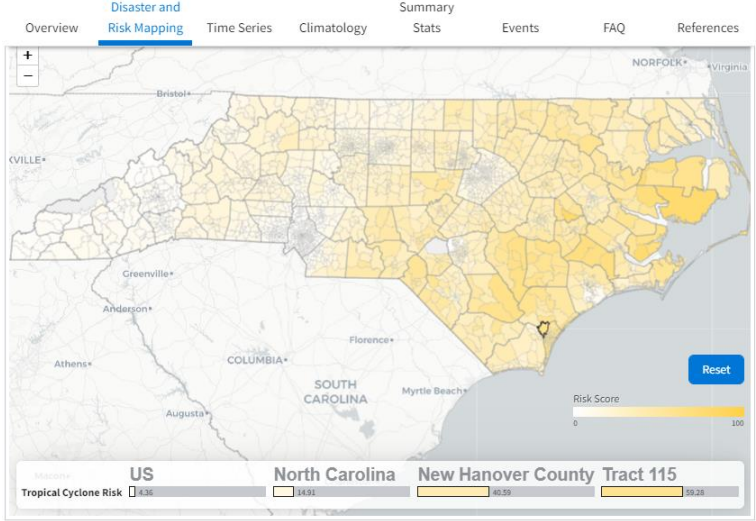
Age 65+
Age < 18
Disabled Population
Single Parent Households
Minority Population
English Spoken "Less Than Well"
Reset
US
Louisiana
Orleans Parish
Tract 17.51
Income
--
--
$30,177.00
$8,307.00


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"
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
Reset
% of Households
0
25
US
Louisiana
Orleans Parish
Tract 17.51
No Vehicle
--
--
19.10%
59.50%

For interactive data, charts, mapping, and disaster summaries (1980-2022):





County and Census tract multi-hazard risk / vulnerability mapping:

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

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

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

- 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.

- Census American Community Survey 2014-2018 (5-year) Summary Data

- CDC/ATSDR Social Vulnerability Index (2018)

Adam.Smith@noaa.gov