Economic Impact of Severe Weather Events

Connecticut Insurance Department's Severe Weather Mitigation & Resiliency Advisory Council

December 18, 2024

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December 5, 2024 – "Hurricanes, severe thunderstorms and floods drive insured losses above USD 100 billion for 5th consecutive year, says Swiss Re Institute"

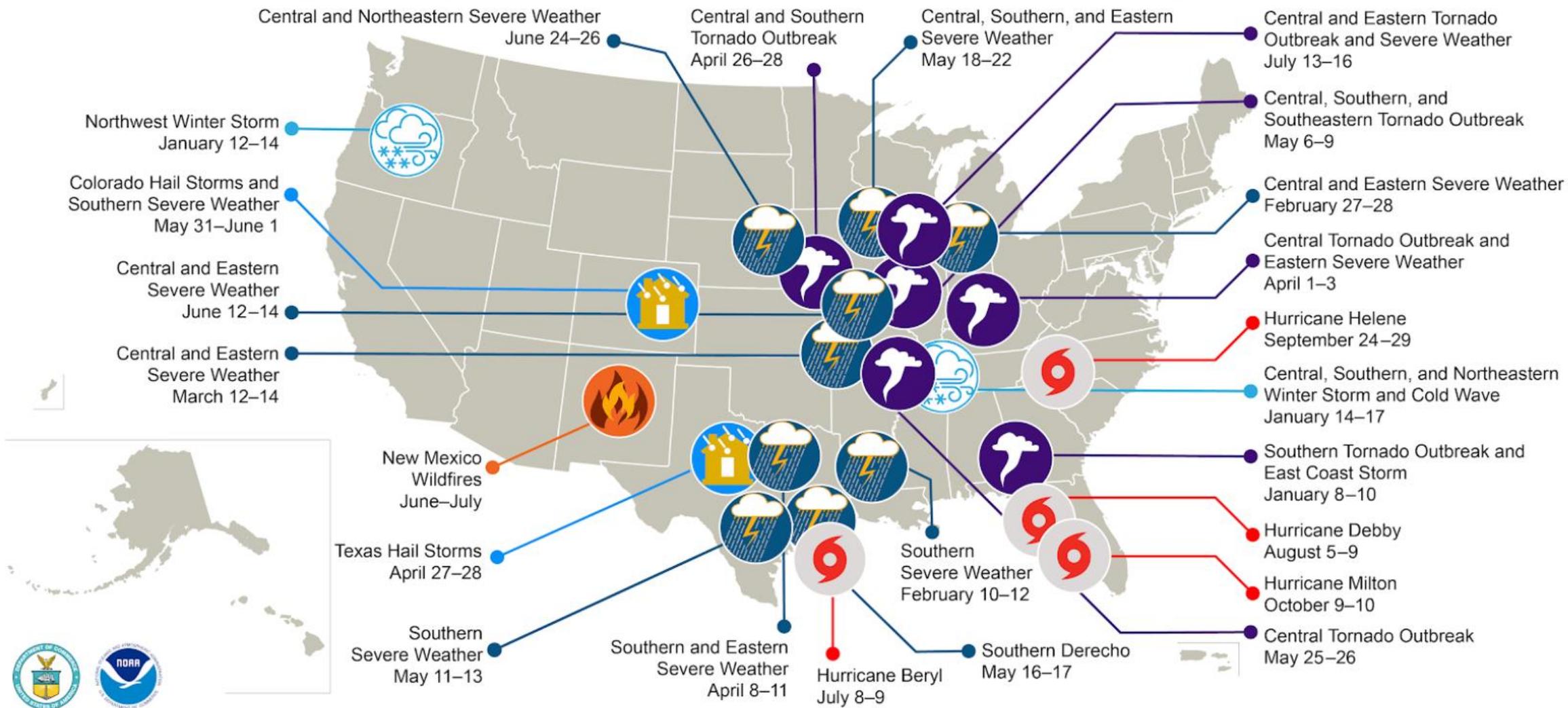|	2024	2023	Annual change	Previous 10-y average
Economic losses (total)	320	302	6%	254
Nat cat	310	291	6%	241
Man-made	10	11	−8%	13
Insured losses (total)	144	125	16%	108
Nat cat	135	115	17%	98
Man-made	9	10	−7%	10

Globally, insured losses are approximately 40 to 45 percent of total economic losses => i.e., the protection gap

U.S. Insured losses are estimated to be roughly $90 billion

Goals of the presentation:

- Economic impact from a U.S. (& CT) context

- What is driving total impacts?

- Understanding the role of insurance and risk reduction

- What is not included in economic impact assessments?

U.S. 2024 Billion-Dollar Weather and Climate Disasters

Legend: Drought/Heat Wave · Flooding · Hail · Severe Weather · Tornado Outbreak · Tropical Cyclone · Wildfire · Winter Storm/Cold Wave

- Central and Northeastern Severe Weather — June 24–26
- Central and Southern Tornado Outbreak — April 26–28
- Central, Southern, and Eastern Severe Weather — May 18–22
- Central and Eastern Tornado Outbreak and Severe Weather — July 13–16
- Central, Southern, and Southeastern Tornado Outbreak — May 6–9
- Northwest Winter Storm — January 12–14
- Central and Eastern Severe Weather — February 27–28
- Colorado Hail Storms and Southern Severe Weather — May 31–June 1
- Central Tornado Outbreak and Eastern Severe Weather — April 1–3
- Central and Eastern Severe Weather — June 12–14
- Hurricane Helene — September 24–29
- Central and Eastern Severe Weather — March 12–14
- Central, Southern, and Northeastern Winter Storm and Cold Wave — January 14–17
- New Mexico Wildfires — June–July
- Southern Tornado Outbreak and East Coast Storm — January 8–10
- Texas Hail Storms — April 27–28
- Hurricane Debby — August 5–9
- Southern Severe Weather — February 10–12
- Hurricane Milton — October 9–10
- Southern Severe Weather — May 11–13
- Southern and Eastern Severe Weather — April 8–11
- Hurricane Beryl — July 8–9
- Southern Derecho — May 16–17
- Central Tornado Outbreak — May 25–26

*This map denotes the approximate location for each of the **24 separate billion-dollar weather and climate disasters that impacted the United States through October 2024.***

2024 U.S. economic costs through October are estimated at $61.6 billion

- These costs include:
  - physical damage to residential, commercial, and municipal buildings;
  - material assets (content) within buildings;
  - time element losses such as business interruption or loss of living quarters;
  - damage to vehicles and boats;
  - public assets including roads, bridges, levees;
  - electrical infrastructure and offshore energy platforms;
  - agricultural assets including crops, livestock, and commercial timber;
  - and wildfire suppression costs, among others.

Select Time Period Comparisons of United States Billion-Dollar Drought, Flooding, Freeze, Severe Storm, Tropical Cyclone, Wildfire, and Winter Storm Statistics (CPI-Adjusted)

Time Period	Billion-Dollar Disasters	Events/Year	Cost	Percent of Total Cost	Cost/Year	Deaths	Deaths/Year
1980s (1980-1989)	33	3.3	$218.9B	7.8%	$21.9B	2,994	299
1990s (1990-1999)	57	5.7	$334.1B	12.0%	$33.4B	3,075	308
2000s (2000-2009)	67	6.7	$619.6B	22.2%	$62.0B	3,102	310
2010s (2010-2019)	131	13.1	$993.4B	35.6%	$99.3B	5,227	523
Last 5 Years (2019-2023)	102	20.4	$617.5B	22.1%	$123.5B	1,996	399
Last 3 Years (2021-2023)	66	22.0	$441.8B	15.8%	$147.3B	1,690	563
Last Year (2023)	28	28.0	$95.1B	3.4%	$95.1B	492	492
All Years (1980-2024)*	**400**	**8.9**	**$2,789.7B**	**100.0%**	**$62.0B**	**16,768**	**373**

Cost statistics not included for Hurricane Milton (August 2024), Hurricane Helene (September 2024)

Source: https://www.ncei.noaa.gov/access/billions/state-summary/US

Select Time Period Comparisons of Connecticut Billion-Dollar Drought, Flooding, Freeze, Severe Storm, Tropical Cyclone, Wildfire, and Winter Storm Statistics (CPI-Adjusted)

Time Period	Billion-Dollar Disasters	Events/Year	Cost	Percent of Total Cost
1980s (1980-1989)	7	0.7	$500M-$1.0B	6.1%
1990s (1990-1999)	12	1.2	$2.0B-$5.0B	20.7%
2000s (2000-2009)	2	0.2	$100M-$250M	1.2%
2010s (2010-2019)	14	1.4	$5.0B-$10.0B	48.5%
Last 5 Years (2019-2023)	9	1.8	$2.0B-$5.0B	23.2%
Last 3 Years (2021-2023)	6	2.0	$1.0B-$2.0B	13.6%
Last Year (2023)	2	2.0	$100M-$250M	2.2%
All Years (1980-2024)*	45	1.0	$10.0B-$20.0B	100.0%

Source: https://www.ncei.noaa.gov/access/billions/state-summary/CT

Disaster(s) by Incident Category

*Includes Subcategories

Hurricane	Severe Storm	Snowstorm	Flood	Tornado	Biological	Fire
14	12	8	3	3	2	1
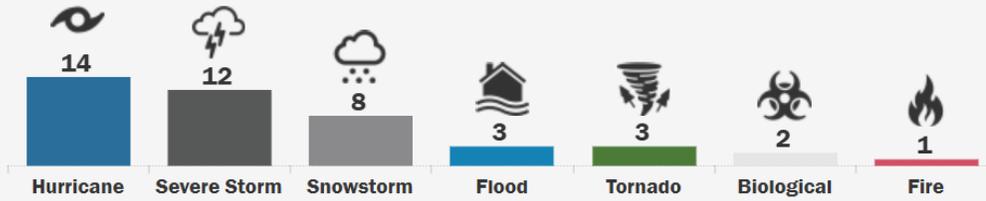
Most Frequent Incident Category by County

Statewide disasters are not included in the county disaster count

© 2024 Mapbox © OpenStreetMap

Disaster(s) by Year

5

1960 1970 1980 1990 2000 2010 2020
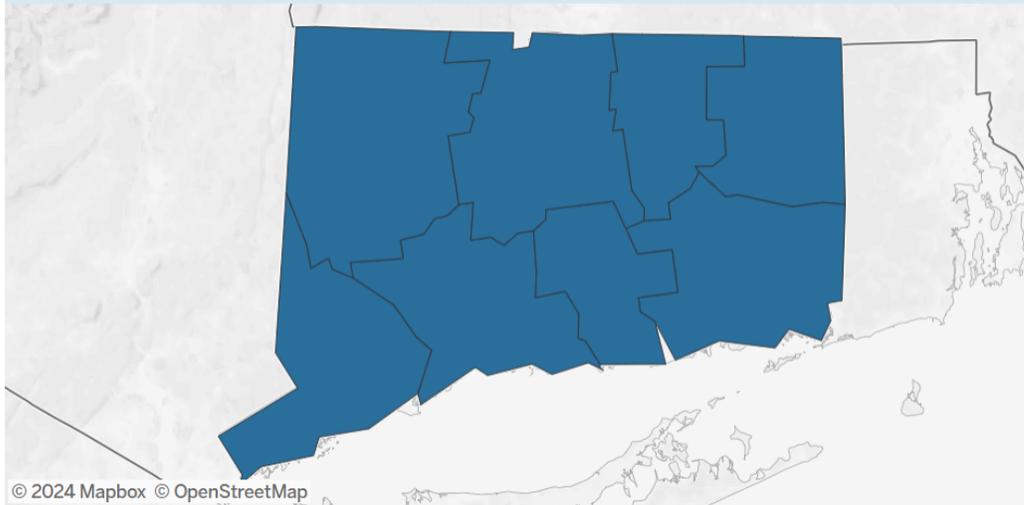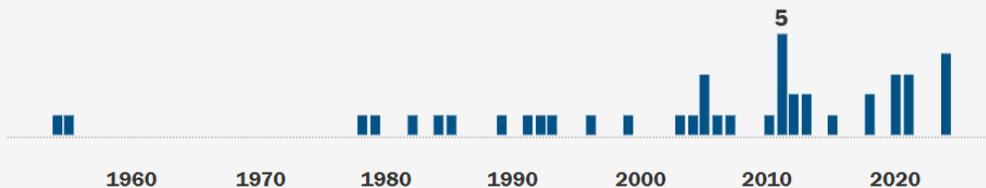
Select a date range to narrow your search:

Start Date: 5/2/1953
End Date: 12/17/2024

Use quick filters to explore your location:

State or Territory: Connecticut
County: (All)

Use quick filters to explore incidents:

Incident Category: (All)
Incident Subcategory: (All)

Use quick filters to narrow down a declaration:

Declaration Type: (All)

43 Disasters Declared
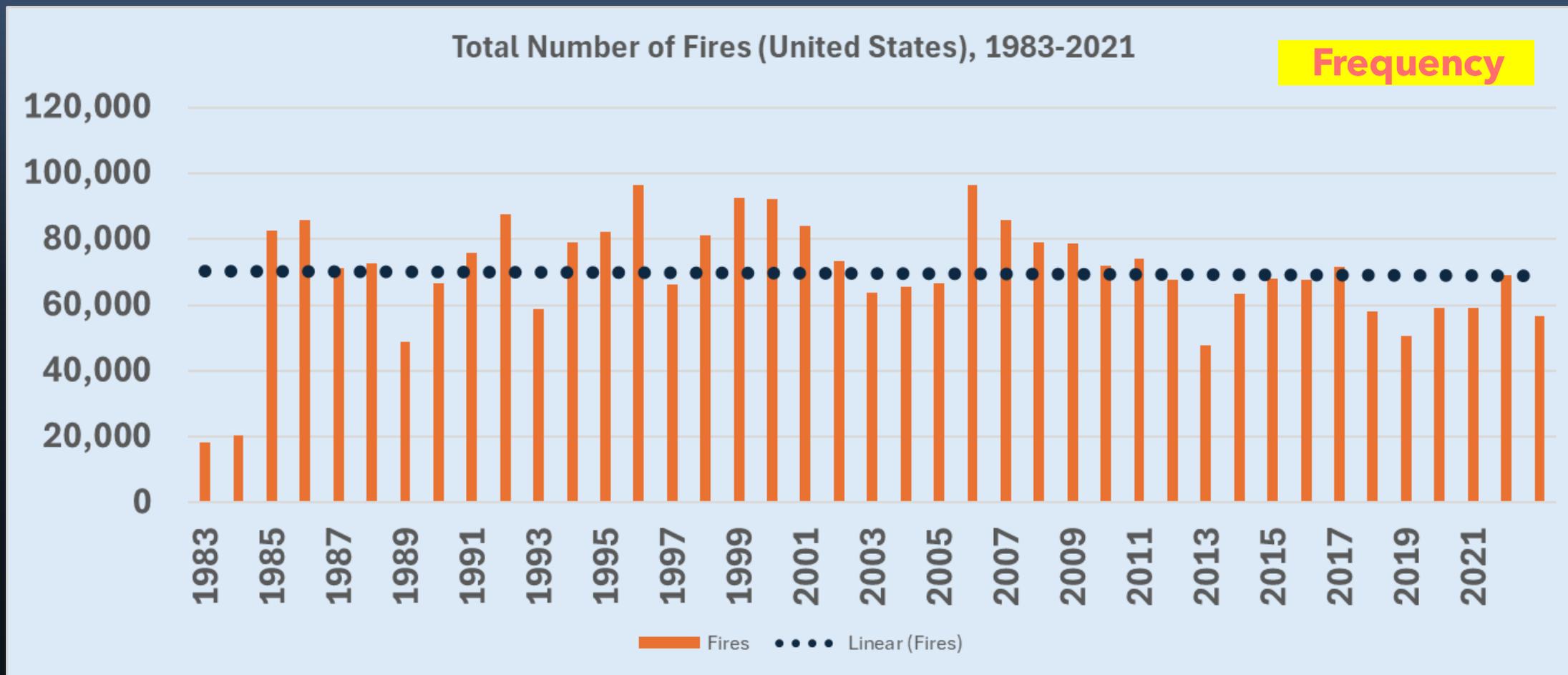In Connecticut

(May 2, 1953 - Dec 17, 2024)

Source: https://www.fema.gov/data-visualization/disaster-declarations-states-and-counties

9
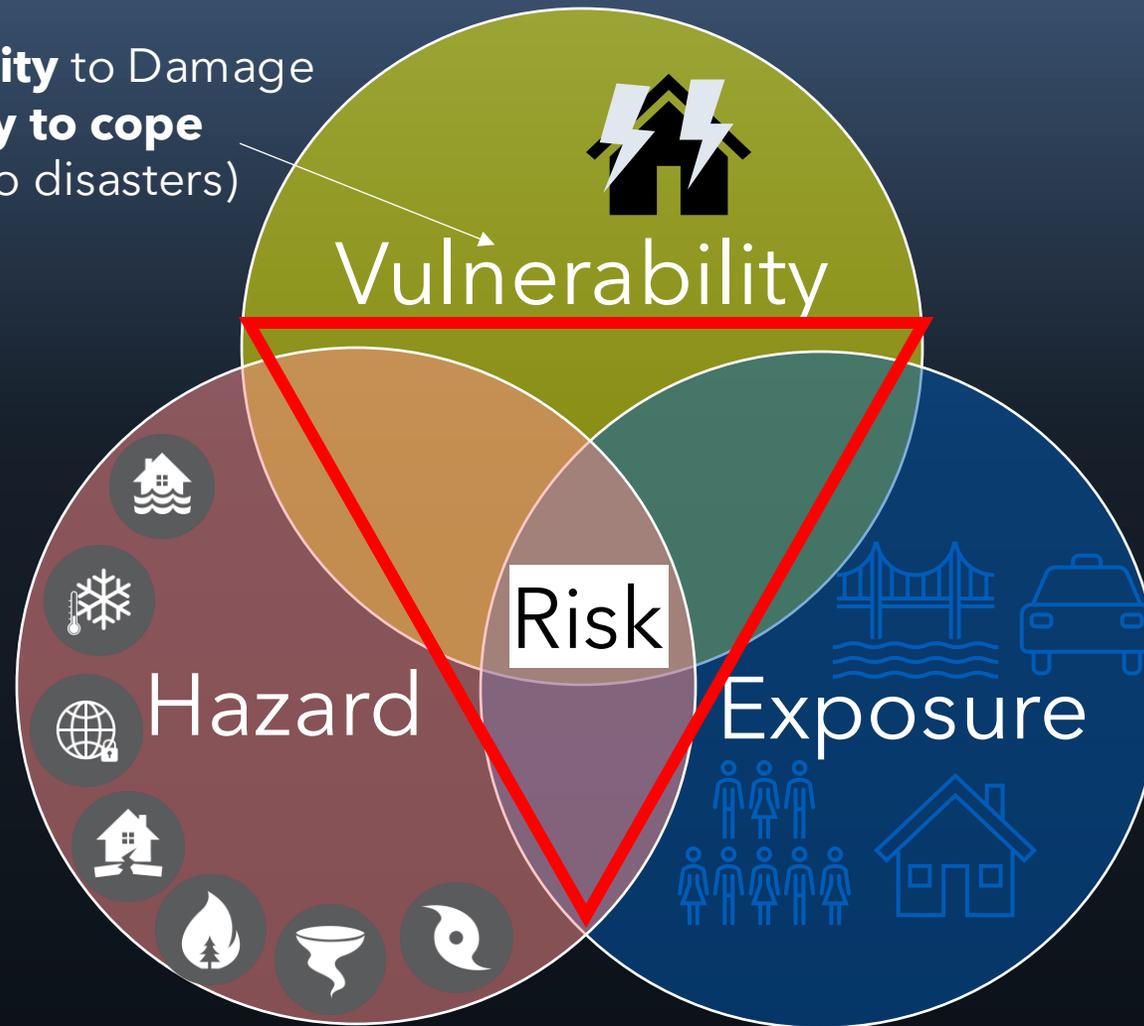
State of Wildfire Risk – Number of Fires

Total Number of Fires (United States), 1983-2021
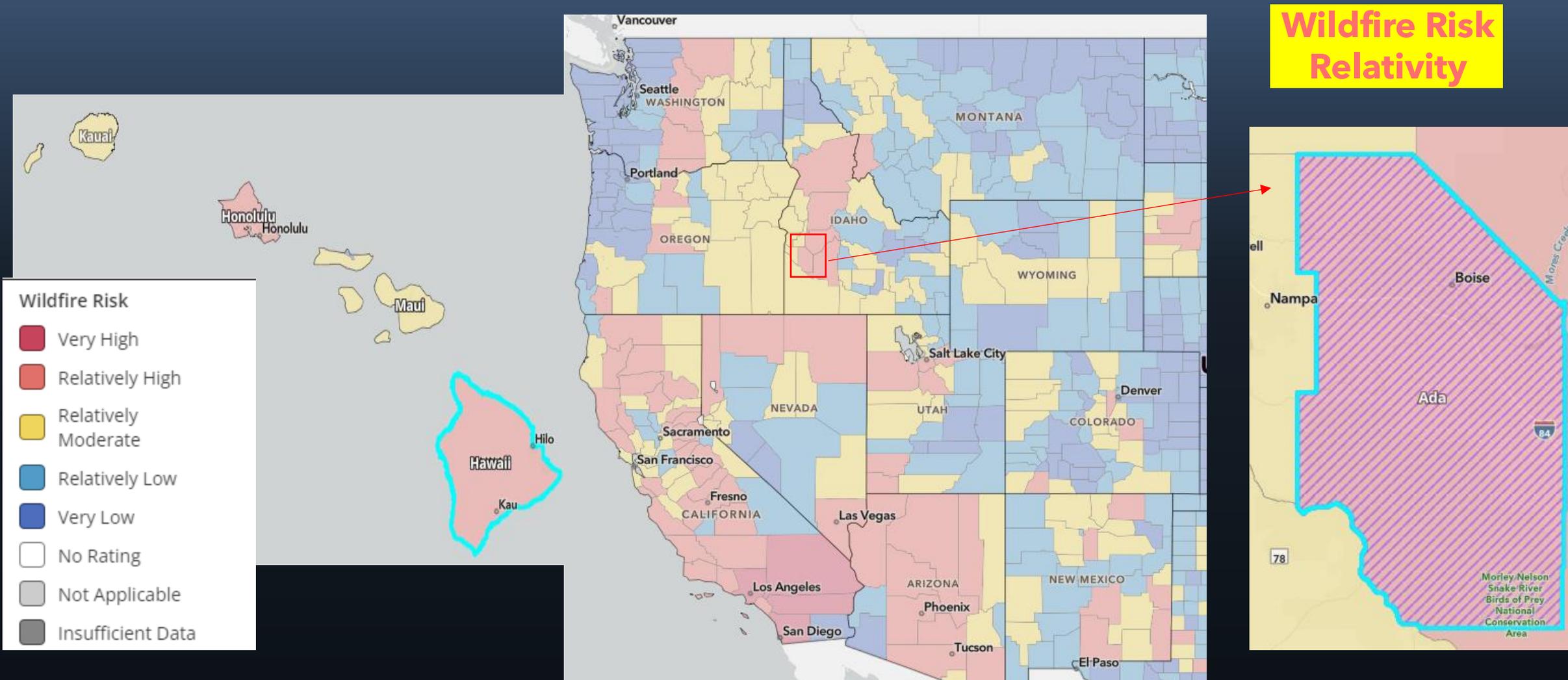
Frequency

Source: Acres burned

State of Wildfire Risk – Acres Burned

"Megafires may well become the new normal as global temperatures continue to rise," says Niklas Hagelberg, a United Nations Environment Programme (UNEP) climate change expert.
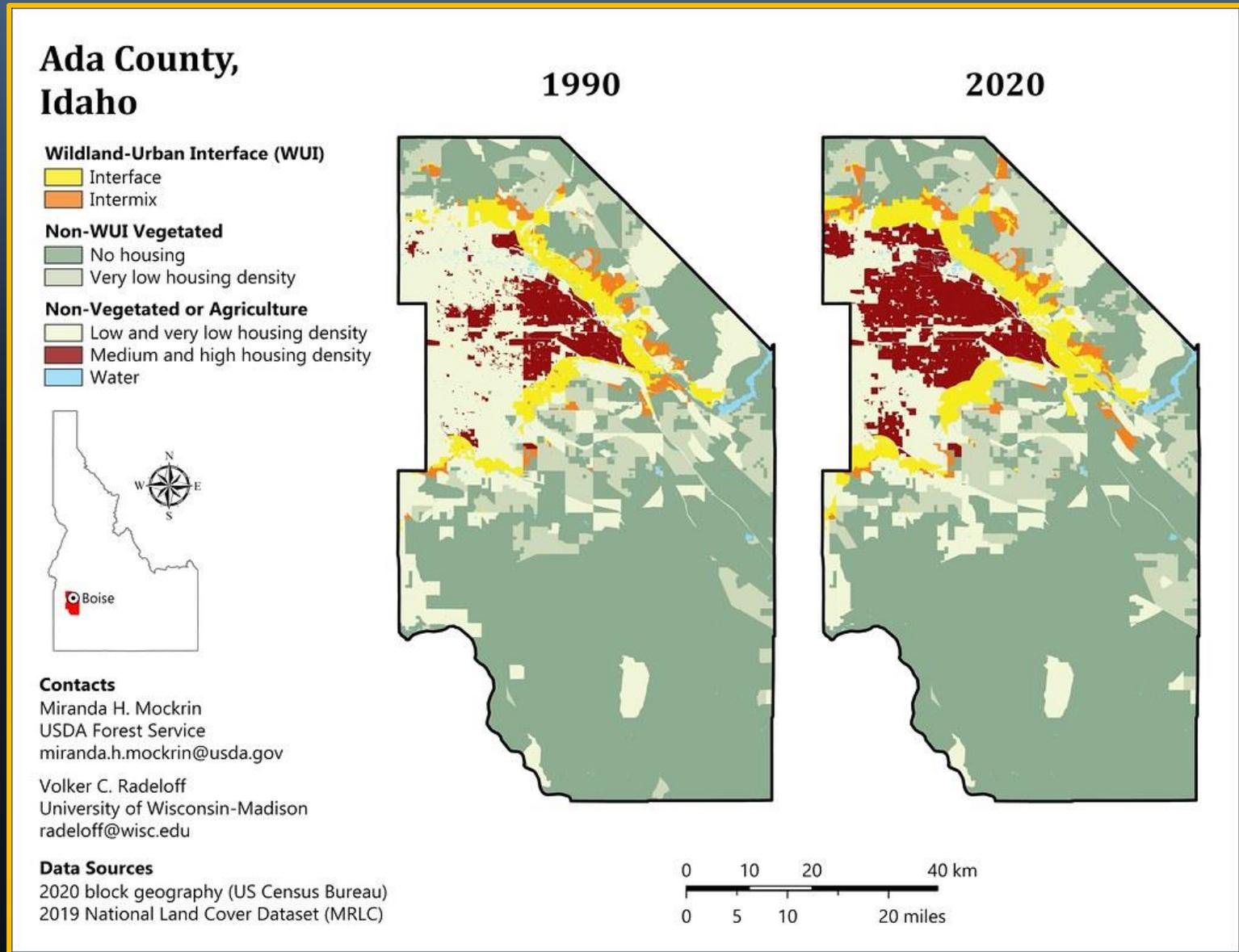

Total Acres Burned (United States), 1983-2021

Severity

Source: Acres burned
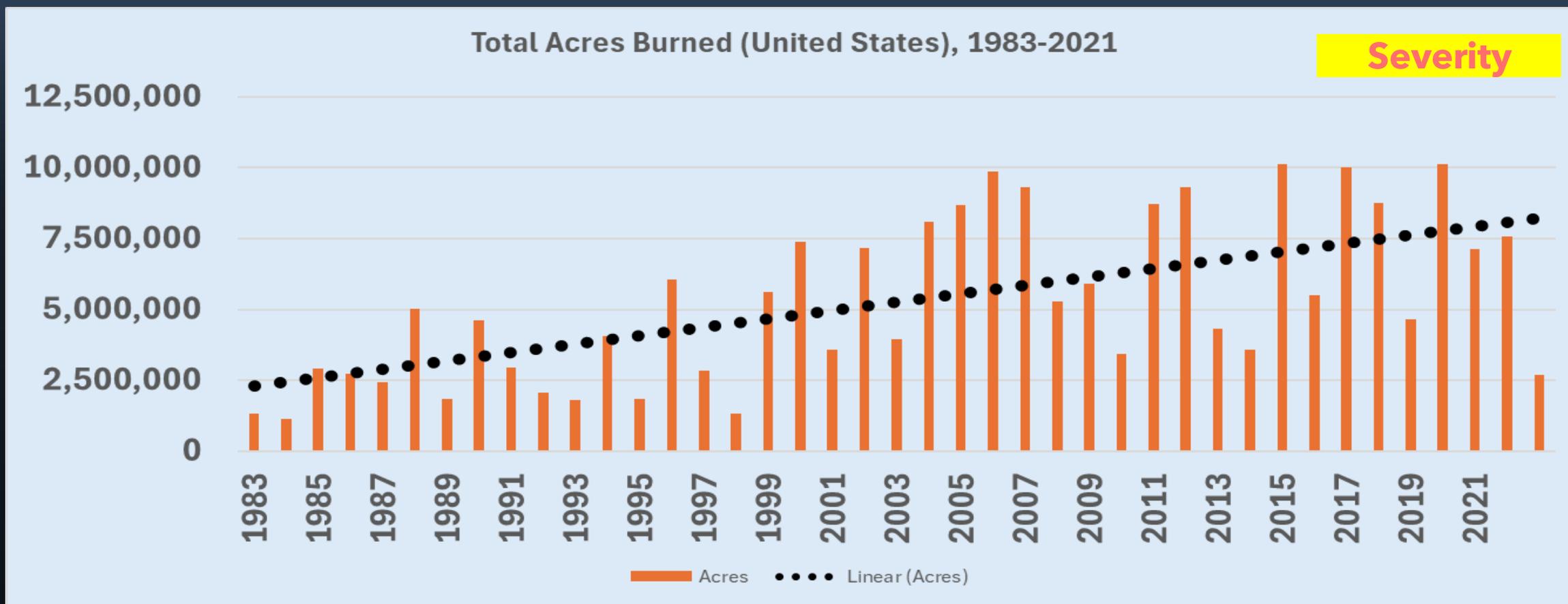
A Look at FEMA's Wildfire Risk Map –Western US

Wildfire Risk Relativity

Wildfire Risk
- Very High
- Relatively High
- Relatively Moderate
- Relatively Low
- Very Low
- No Rating
- Not Applicable
- Insufficient Data

Source: FEMA NRI

Boise, Idaho Region – Explosive Housing Growth in the Interior West

FEMA Wildfire Risk Index is "Relatively High"

Ada County, Idaho

Wildland-Urban Interface (WUI)
- Interface
- Intermix

Non-WUI Vegetated
- No housing
- Very low housing density

Non-Vegetated or Agriculture
- Low and very low housing density
- Medium and high housing density
- Water

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Data Sources
2020 block geography (US Census Bureau)
2019 National Land Cover Dataset (MRLC)

Source Link: USDA

14

The "Expanding Bull's-Eye Effect"

A sample event scenario is overlaid to show how expanding development (more urban areas) creates larger areas of potential impacts from hazards.

https://chubasco.niu.edu/ebe.htm
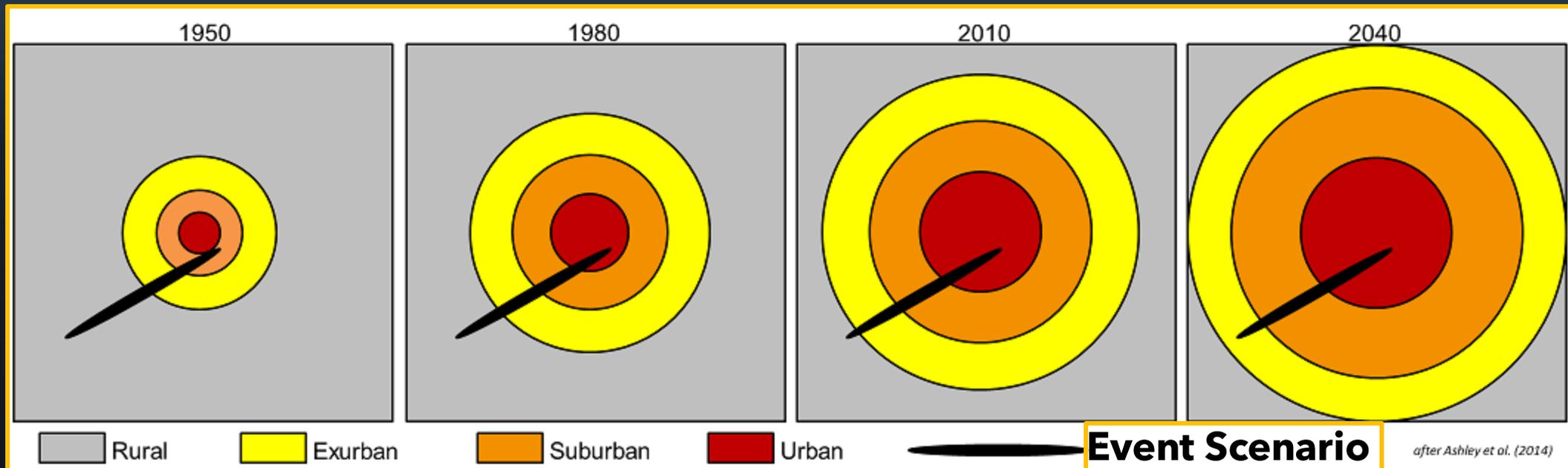
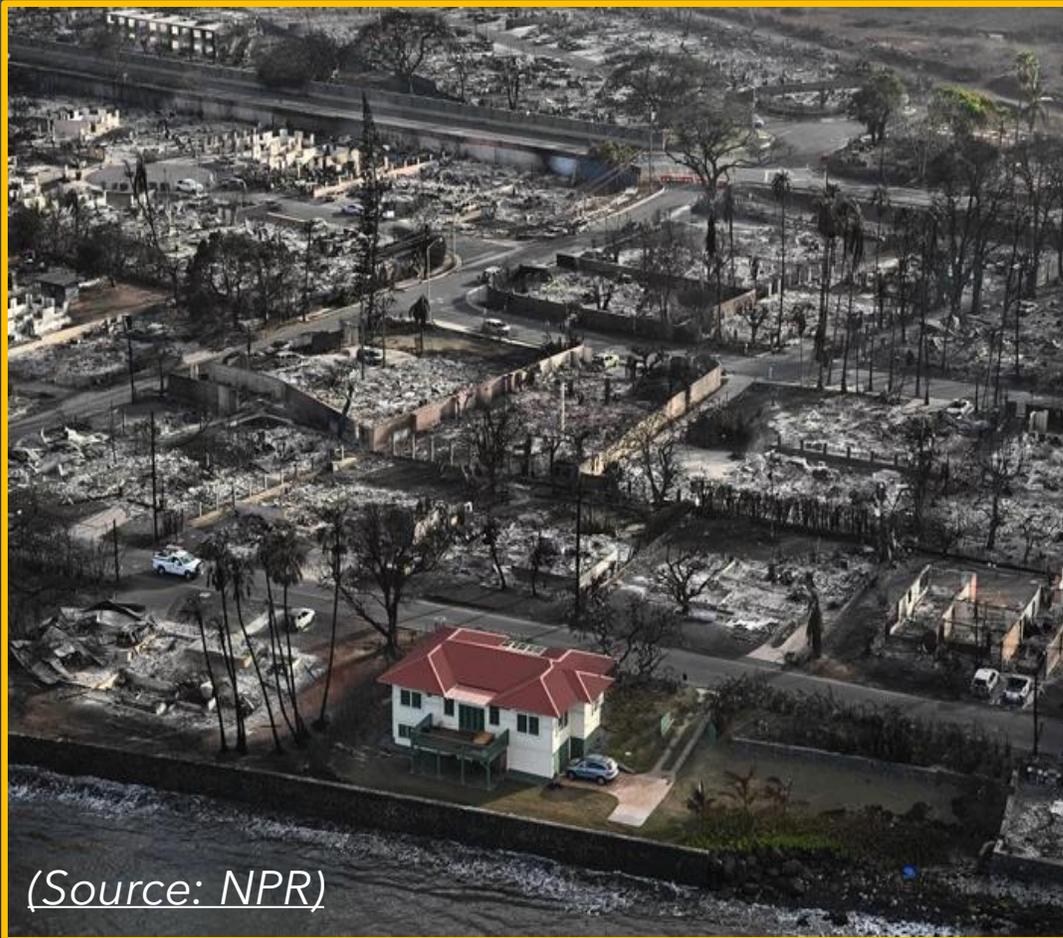# Leveraging Engineering and Building Science Research

$$\text{Mean Damage Ratio (MDR)} = \frac{\text{Cost of Repair}}{\text{Building Replacement Value}}$$
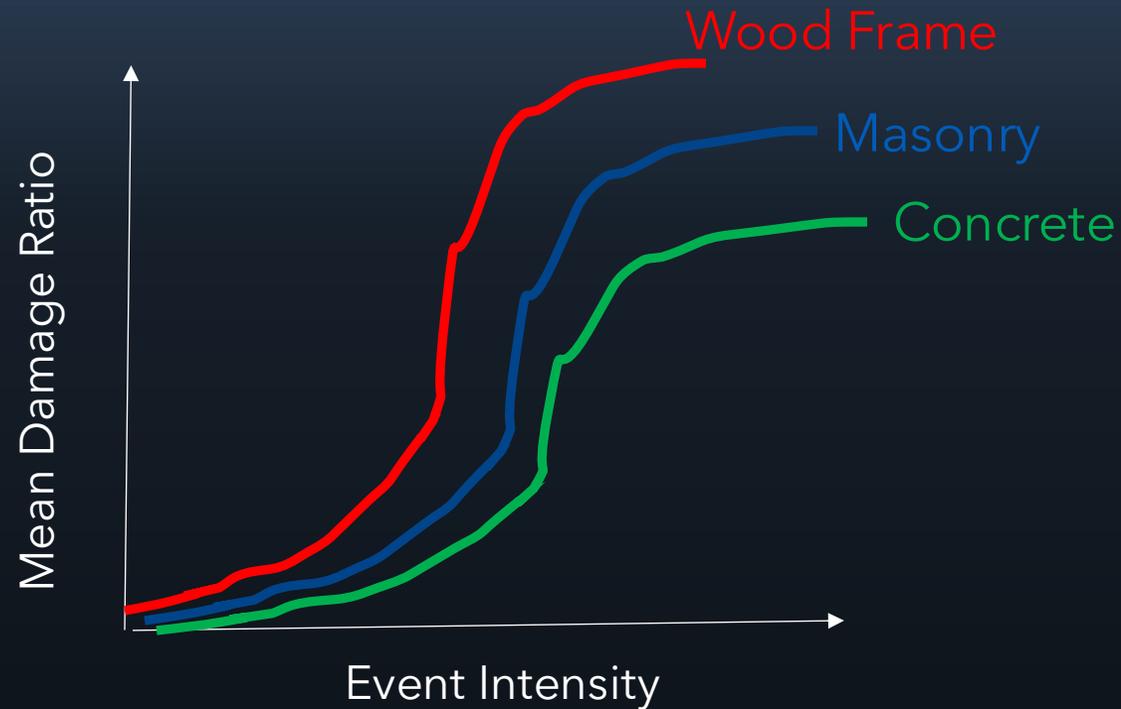
- Expected damage for a given hazard intensity
- Varies by building's main characteristics and additional building information
- Consideration of local/regional Building codes adoption and enforcement

- Developed by highly trained engineers
- Published research and the results of laboratory testing (e.g., IBHS)
- On-site damage surveys
- Detailed claims data

Disaster Preparation Starts Before the Disaster Hits

(Source: NPR)

Property-Level

Disaster Mitigation and Resiliency

National Level

Community Level

State Level

17

Critical Role of Property Insurance

1) Having insurance in place improves both the speed & quality of disaster recovery

   ❑ [for each percentage point increase in insurance penetration a country's recovery time reduced by almost 12 months](#)

   ❑ Recall protection gaps are approximately 60% of disaster losses

   ❑ In the U.S., a number of perils are not covered by traditional insurance – flood, earthquake, mudflows, landslides

2) Assuming risk-based pricing of insurance, it is able to provide an incentive for risk reduction measures **(i.e., lower property vulnerability)** to be undertaken prior to an event. Endorsements to policies can also allow for risk reduction following an event – e.g. built back to code and/or beyond code.

Mitigation Saves up to $13 per $1 Invested

	ADOPT CODE	ABOVE CODE	BUILDING RETROFIT	LIFELINE RETROFIT	FEDERAL GRANTS
Overall Benefit-Cost Ratio	11:1	4:1	4:1	4:1	6:1
Cost ($ billion)	$1/year	$4/year	$520	$0.6	$27
Benefit ($ billion)	$13/year	$16/year	$2200	$2.5	$160
Riverine Flood	6:1	5:1	6:1	8:1	7:1
Hurricane Surge	not applicable	7:1	not applicable	not applicable	not applicable
Wind	10:1	5:1	6:1	7:1	5:1
Earthquake	12:1	4:1	13:1	3:1	3:1
Wildland-Urban Interface Fire	not applicable	4:1	2:1	not applicable	3:1

National Institute of **BUILDING SCIENCES**™

TABLE 1. Nationwide average benefit-cost ratio by hazard and mitigation measure. BCRs can vary geographically and can be much higher in some places. Find more details in the report.

**Source:** https://www.nibs.org/files/pdfs/ms_v4_overview.pdf

2022 losses => $165 billion in economic costs (60% insured) & 474 fatalities

- These costs include:
  - physical damage to residential, commercial, and municipal buildings;
  - material assets (content) within buildings;
  - time element losses such as business interruption or loss of living quarters;
  - damage to vehicles and boats;
  - public assets including roads, bridges, levees;
  - electrical infrastructure and offshore energy platforms;
  - agricultural assets including crops, livestock, and commercial timber;
  - and wildfire suppression costs, among others.

- These disaster costs **do not take into account losses to**:
  - natural capital or environmental degradation;
  - **mental or physical healthcare related costs**,
  - the value of a statistical life (VSL);
  - or supply chain, contingent business interruption costs.

> *Estimates should be considered conservative with respect to what is truly lost, but **cannot be completely measured due to a lack of consistently available data***

Measuring Disaster Losses
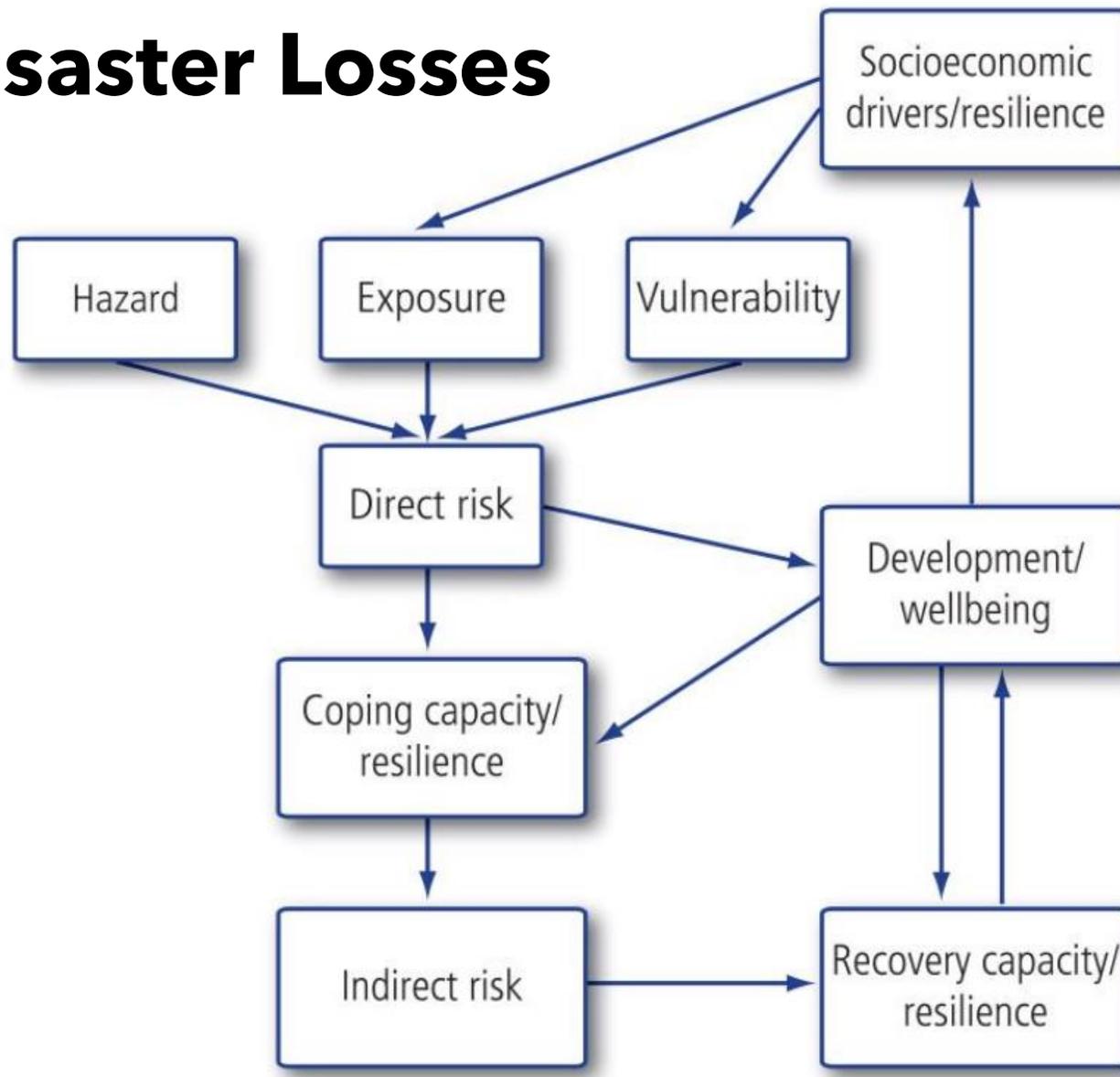
Direct *= Immediate effect due to direct contact with the hazard (e.g., loss of life, physical and monetary loss)*

Indirect *= Occurs as a result of and in response to the direct impacts in the medium-long term (e.g., relief, recovery, reconstruction costs, longer term socio-economic effects)*

Source: Making communities more flood resilient: The role of cost benefit analysis and other decision-support tools in disaster risk reduction