

Update of Hazard Mitigation Plan for the Naugatuck Valley Region



Workshop:
Hazard Identification and Risk Assessment

Victoria Brudz, CFM
David Murphy, PE, CFM
Noah Slovin, CFM

WORKSHOP LOGISTICS

- 9:00 – Welcome & Logistics
- 9:05 – Main Presentation
- 9:50 to 10:05 – Breakout Sessions
 - Riverine and dam flood risks
 - Wind, snow, and power outages
 - Geologic hazards (landslides, earthquakes, Cheshire sinkholes)
 - Please comment in the chat back box which group you would like to be placed in
- 10:05 to 10:15 – Report from Sessions & Wrap Up

Agenda

- Purpose and Need for Hazard Mitigation Planning
- Review of Hazards to be Addressed
- Effects of Climate Change
- Report from Municipal Meetings- What Did We Hear?
- Characterizing Hazard Loss Estimates
- FEMA Map Updates (Diane Ifkovic, CT DEEP)
- Next Steps

PURPOSE AND NEED FOR HAZARD MITIGATION PLAN

Authority

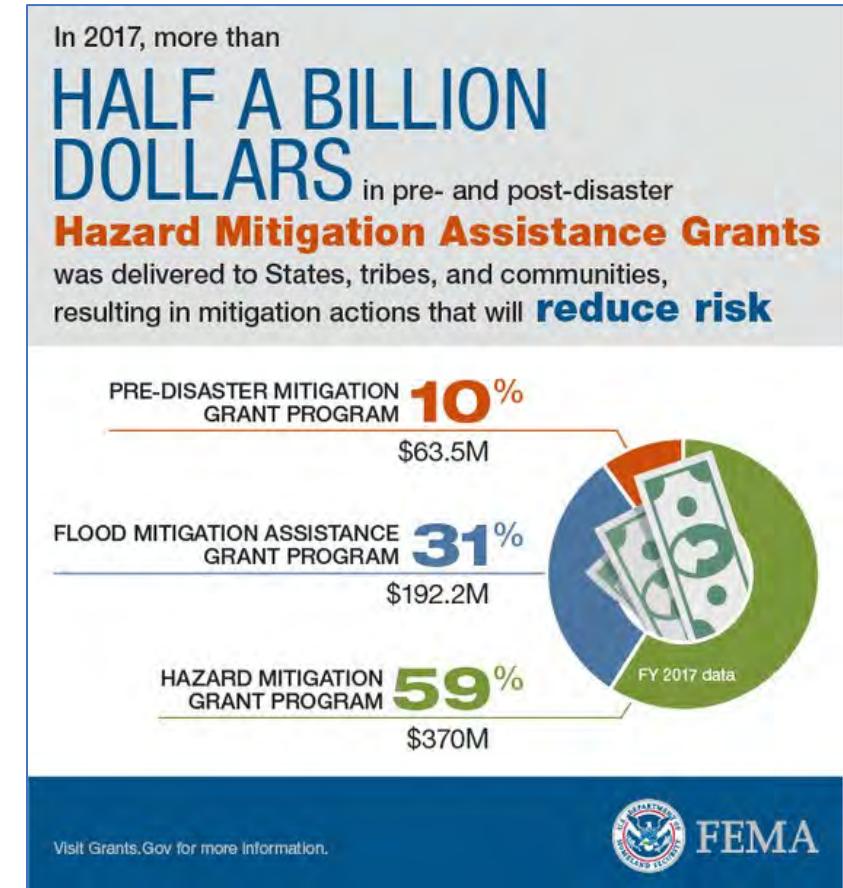
- Disaster Mitigation Act of 2000 (amendments to Stafford Act of 1988)

Goal of Disaster Mitigation Act

- Promote disaster *preparedness*
- Promote hazard mitigation *actions* to reduce losses

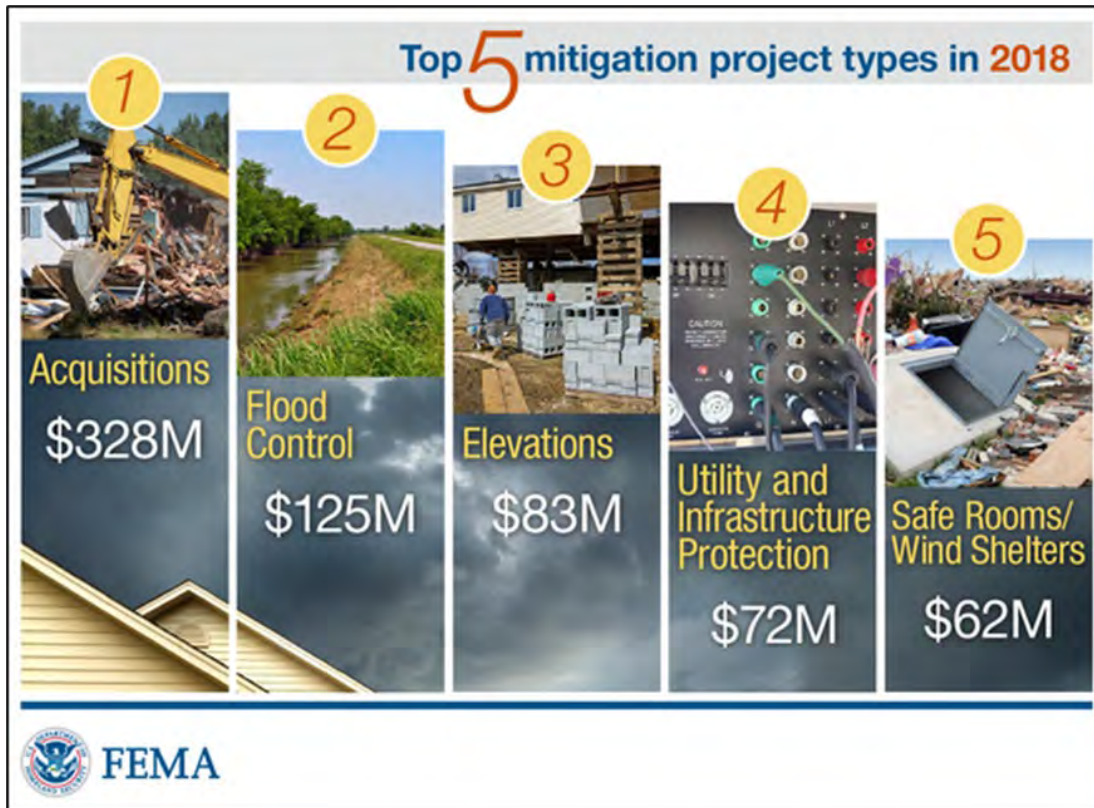
Mitigation Grant Programs

- Flood Mitigation Assistance (FMA)
- Hazard Mitigation Grant Program (HMGP)
- Building Resilient Infrastructure and Communities (BRIC)
 - Replaces Pre-Disaster Mitigation (PDM)
 - Shift from pre-disaster spending to research-supported investment



Graphic courtesy of FEMA

PURPOSE AND NEED FOR HAZARD MITIGATION PLAN



PURPOSE AND NEED FOR HAZARD MITIGATION PLAN

Status of Plans in Connecticut

- Most initial plans developed 2005-2011
- Local plans updated every five years

Status of NVCOG Plans

- Most initial plans developed 2005-2011 under contracts to COGCNV, VCOG, CCRPA
- The most recent plans were adopted between December 2012 and July 2016
- FEMA approvals between February 2013 and September 2016
- Plans expired starting in February 2018 and running through September 2021



PURPOSE AND NEED FOR HAZARD MITIGATION PLAN

What is a Natural Hazard?

- An extreme natural event that poses a risk to people, infrastructure, and resources.



What is Hazard Mitigation?

- Actions we take now that reduce or eliminate long-term risk to people, property, and resources from natural hazards and their effects.



New Elevated Construction



Removal of Structures from Floodplain

HAZARDS TO INCLUDE IN THE PLAN

- Floods
- Hurricanes and Tropical Storms
- Summer Storms
- Tornadoes and High Winds
- Severe Winter Storms
- Dam Failure
- Wildfire

Breakout Rooms:
Riverine & Dam Flood Risks
Wind, Snow, and Power Outage
Geologic Hazards

- Earthquakes

↑
CLIMATE CHANGE

- Landslides and Sinkholes (for some towns)



HAZARDS TO INCLUDE IN THE PLAN

- Floods – Riverine
- Hurricanes and Tropical Storms
- Summer Storms
- Tornadoes and High winds
- Severe Winter Storms
- Dam Failure
- Wildfire
- Earthquakes
- Landslides and Sinkholes (for some towns)



Housatonic River, 2011



Pequabuck River, 2011



Pomperaug River, 2007

HAZARDS TO INCLUDE IN THE PLAN

- Floods – Flash Floods During Intense Rain
- Hurricanes and Tropical Storms
- Summer Storms
- Tornadoes and High winds
- Severe Winter Storms
- Dam Failure
- Wildfire
- Earthquakes
- Landslides and Sinkholes (for some towns)



Waterbury Flood Damage After June 2006 Storms



HAZARDS TO INCLUDE IN THE PLAN

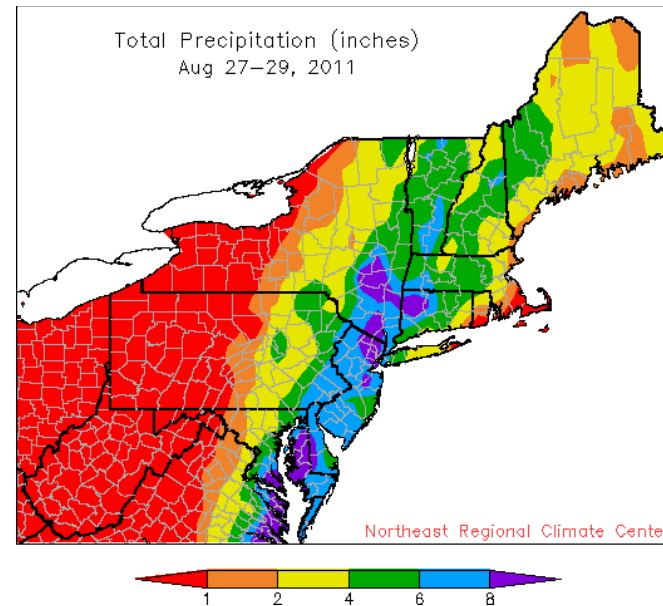
- **Floods – Ice Jams**
- Hurricanes and Tropical Storms
- Summer Storms
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Southbury ice jam damage

HAZARDS TO INCLUDE IN THE PLAN

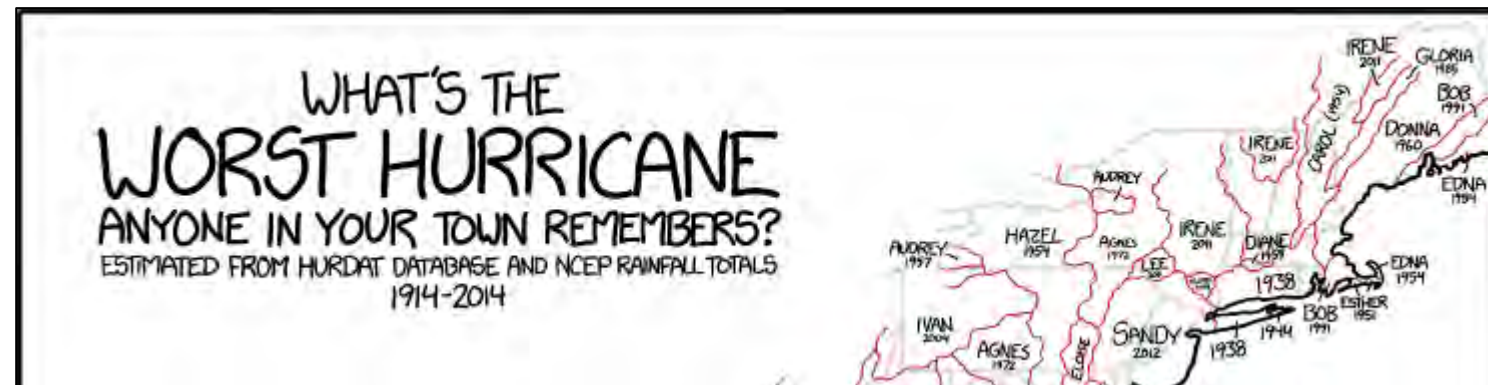
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Courtesy of
Northeast
Climate Data
Center



Downed Power Lines from Tropical Storm Isaias in Cheshire, 2020



HAZARDS TO INCLUDE IN THE PLAN

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- **Summer Storms**
- Tornadoes and High winds
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Funnel Cloud in Woodbury, 2011
New Haven Register

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- **Severe Winter Storms**
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Photos from Waterbury Rep-Am and others



Citizens News



courant



HAZARDS TO INCLUDE IN THE PLAN

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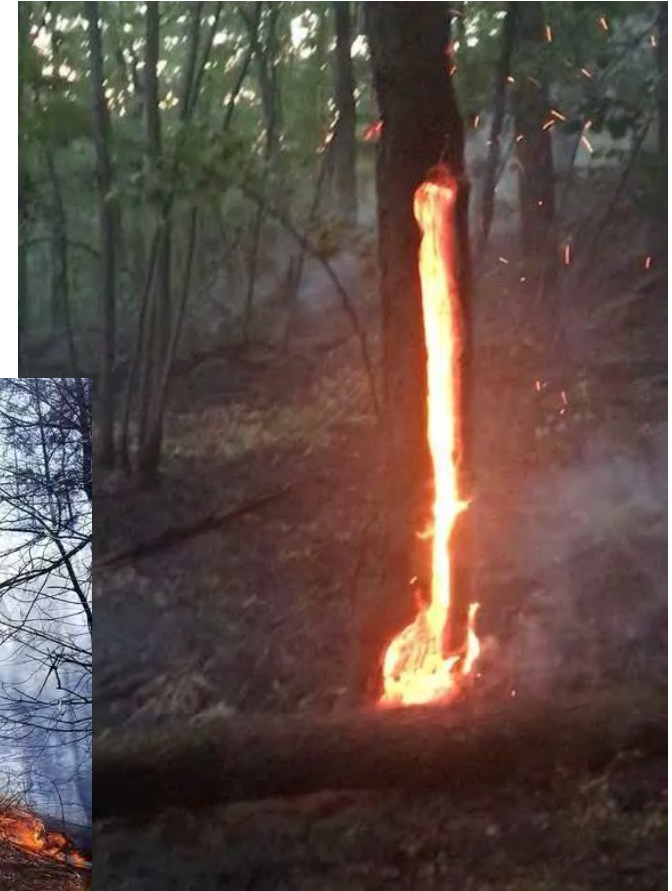
Little River
Photo by David Murphy



Great Hill Reservoir Dam, Seymour
New Haven Register

HAZARDS TO INCLUDE IN THE PLAN

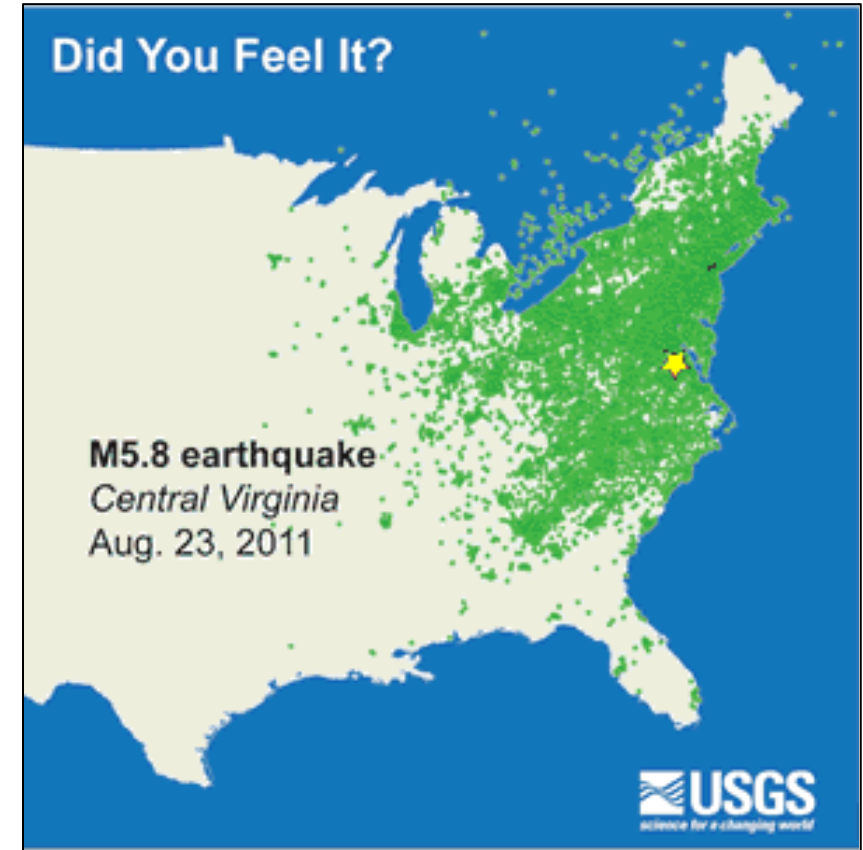
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Beacon Falls (left)
Watertown (right)
Republican American

HAZARDS TO INCLUDE IN THE PLAN

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Courtesy of USGS

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Photos courtesy of New Haven Register

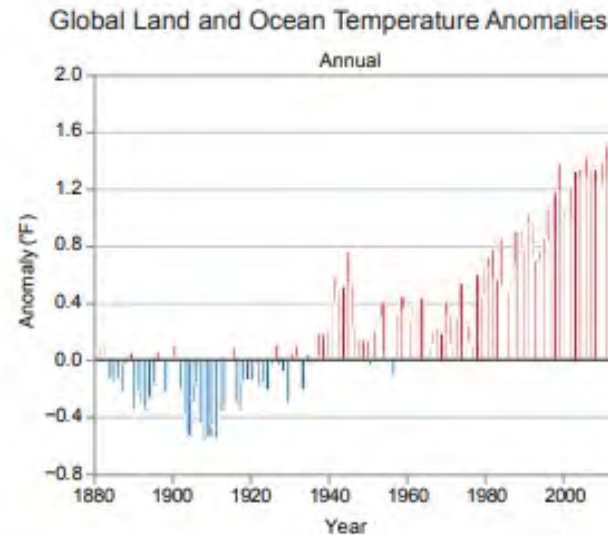


Photo courtesy of Waterbury Rep-Am

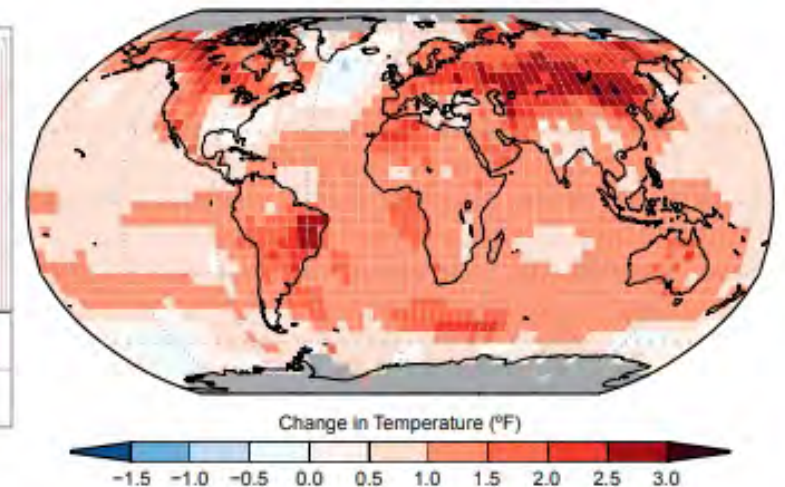
EFFECTS OF CLIMATE CHANGE

- Global average temperatures are increasing
- Growing seasons may fluctuate
- Extreme heat episodes may increase

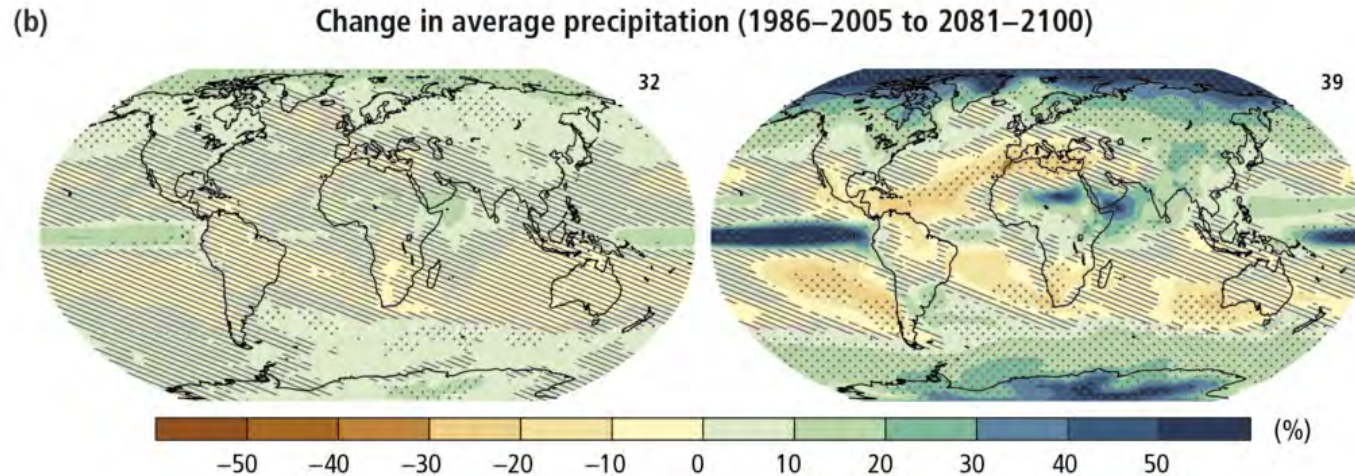
Global Temperatures Continue to Rise



Surface Temperature Change



EFFECTS OF CLIMATE CHANGE



- Precipitation is expected to increase throughout the higher latitude regions
- Winter precipitation may increase, but may not always be snow
- Drought occurrences may increase

REPORT FROM MUNICIPAL MEETINGS

Topics Discussed

- Critical facilities and standby power
- Changes in capabilities
- Changes in risk
- Events of note in the last 4-5 years
- Repetitive loss properties
- Review of prior mitigation actions
- Potential new mitigation actions
- Designation of the local coordinator

So far...

15 Municipalities

1 Scheduled

Prospect 11/25

3 Meetings still need to be complete

Middlebury

Plymouth

Seymour

Let's focus on
these



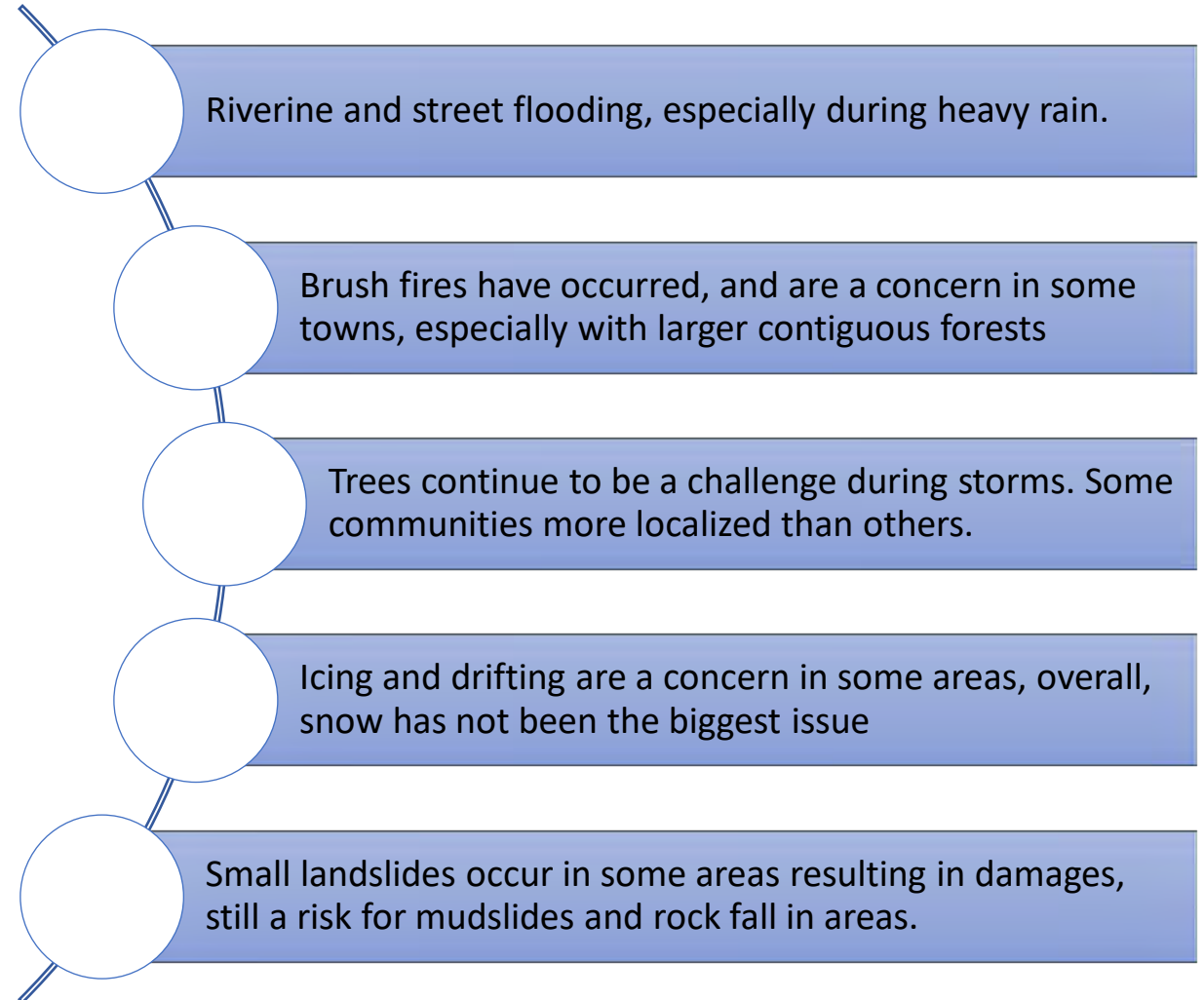
REPORT FROM MUNICIPAL MEETINGS

Changes in Capabilities

- Upgrading backup power at municipal and critical facilities
- Improving drainage, including streetscape projects
- Increasing tree maintenance budget
- Advancing storm response and recovery documentation
- Updating stormwater regulations
- Increasing municipal operation redundancies – IT and facilities
- Education continues to increase for all hazard types

REPORT FROM MUNICIPAL MEETINGS

- Floods
- Hurricanes and Tropical Storms
- Summer Storms
- Tornadoes and High winds
- Severe Winter Storms
- Dam Failure
- Wildfire
- Earthquakes
- Ice Jams, Landslides, and Sinkholes (for some towns)



VULNERABILITIES, RISKS, AND LOSS ESTIMATES

Methods of Characterizing Risk

- State Hazard Mitigation Plan
- FEMA maps
- National Climate Data Center, or NCDC (now National Centers for Environmental Information, or NCEI)
- FEMA Public Assistance (PA) reimbursements after disasters
- National Flood Insurance Program (NFIP) claims
- Repetitive Loss property lists
- Meetings with local planning teams!



VULNERABILITIES, RISKS, AND LOSS ESTIMATES

Methods of Quantifying Losses

- NCEI
- FEMA PA reimbursements after disasters
- NFIP claims
- Downscaling from countywide losses in the State Hazard Mitigation Plan
- HAZUS-MH
- Asking local planning teams for typical losses from:
 - Severe Winter Storms
 - Severe Thunderstorm
 - Typical Wildfire

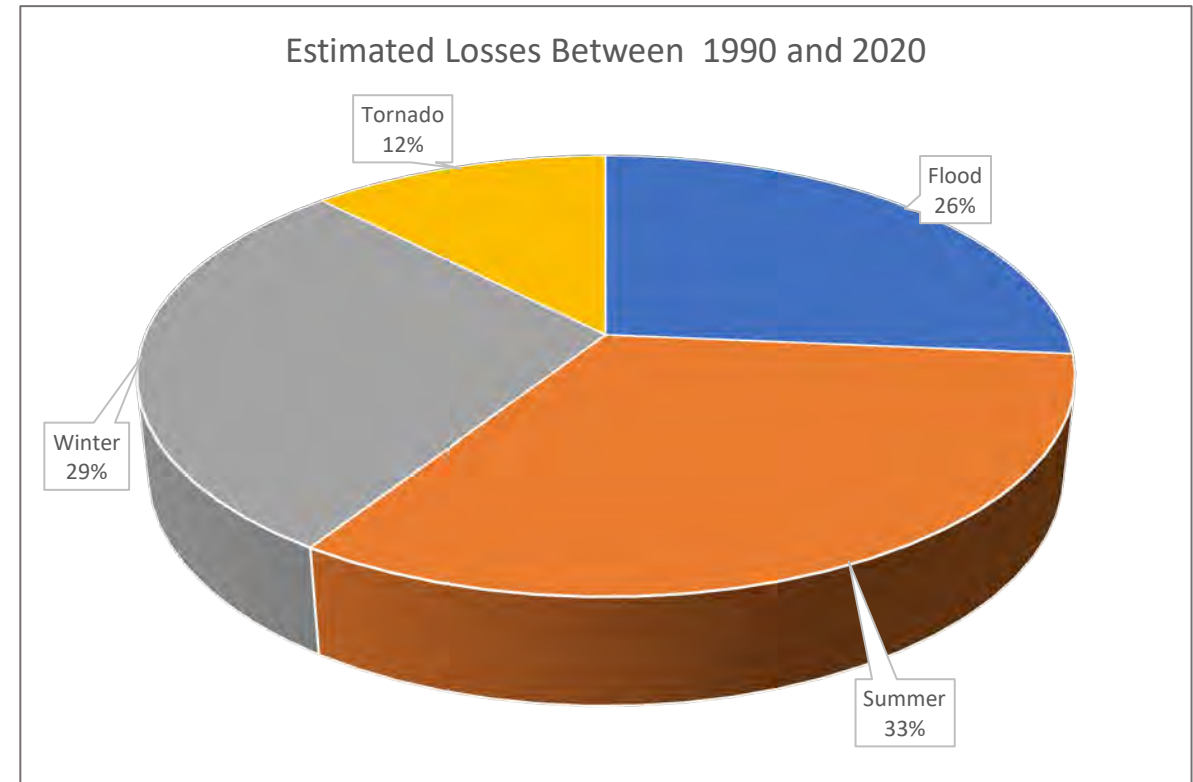


LOSSES FROM NATURAL HAZARDS (NCEI)

	Events Since 2013	Costs Since 2013	Average Annual Cost (2013-2019)	Injuries Since 2013	Deaths Since 2013	Episodes
Flood	137	\$18,706	\$2,672	0	0	Flood: 34 Flash Flood: 89
Summer Storms & Thunderstorms	490	\$1,135,659	\$162,237	7	4	Drought: 3 Extreme Heat: 46 High Winds: 371 Hail: 44 Lightning: 24
Winter Storm	419	\$366,925	\$52,418	6	3	Blizzard: 15 Drought: 5 Extreme Cold/Wind Chill: 38 Frost/Freeze: 3 Hail: 2 Heavy Snow: 76 High Winds: 84 Ice Storm: 1 Winter Storm: 60 Winter Weather: 135
Tornado	11	\$425,754	\$60,822	0	0	Tornado: 10 Funnel Cloud: 1

LOSSES FROM NATURAL HAZARDS (NCEI)

	Total losses 1990 – 2020	Average Annual Cost
Flood	\$135,000	\$61,123
Summer Storms & Thunderstorms	\$9,175,300	\$69,354
Winter Storm	\$2,543,300	\$42,011
Tornado	\$5,315,000	\$13,429



LOSSES FROM NATURAL HAZARDS (NCEI)

In summary – based on 2013 to 2020:

- Flash floods occur about 12 times a year and other flood events about 4 to 5 times a year
- High wind events during summer occur about 53 days a year, with wintertime high wind and storm events occurring about 12 days a year
- Heavy snow episodes occur about 10 to 11 days a year
- Extreme heat is a concern about 6 days a year, and extreme cold about 5 days a year
- A tornado may occur about 1 to 2 times per year

FEMA PUBLIC ASSISTANCE (PA) REIMBURSEMENTS

Declared Natural Disasters in Connecticut (2014-2020)

- 2015 Snow Storm
- 2018 Tornadoes
- 2018 Flooding
- 2020 Tropical Storm Isaias (Emergency, not Disaster)

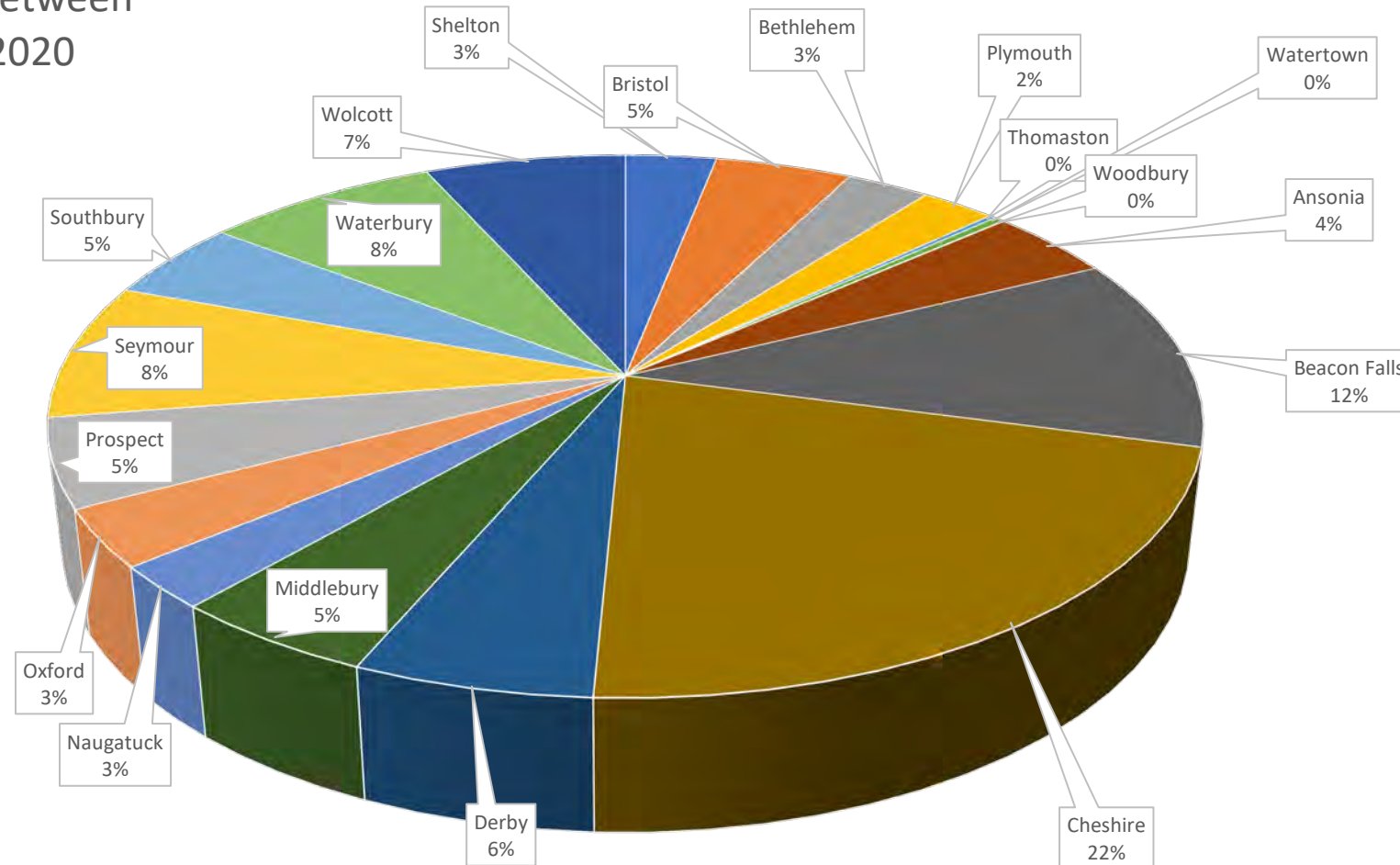
Also...

- 2020 COVID-19



FEMA PUBLIC ASSISTANCE (PA) REIMBURSEMENTS

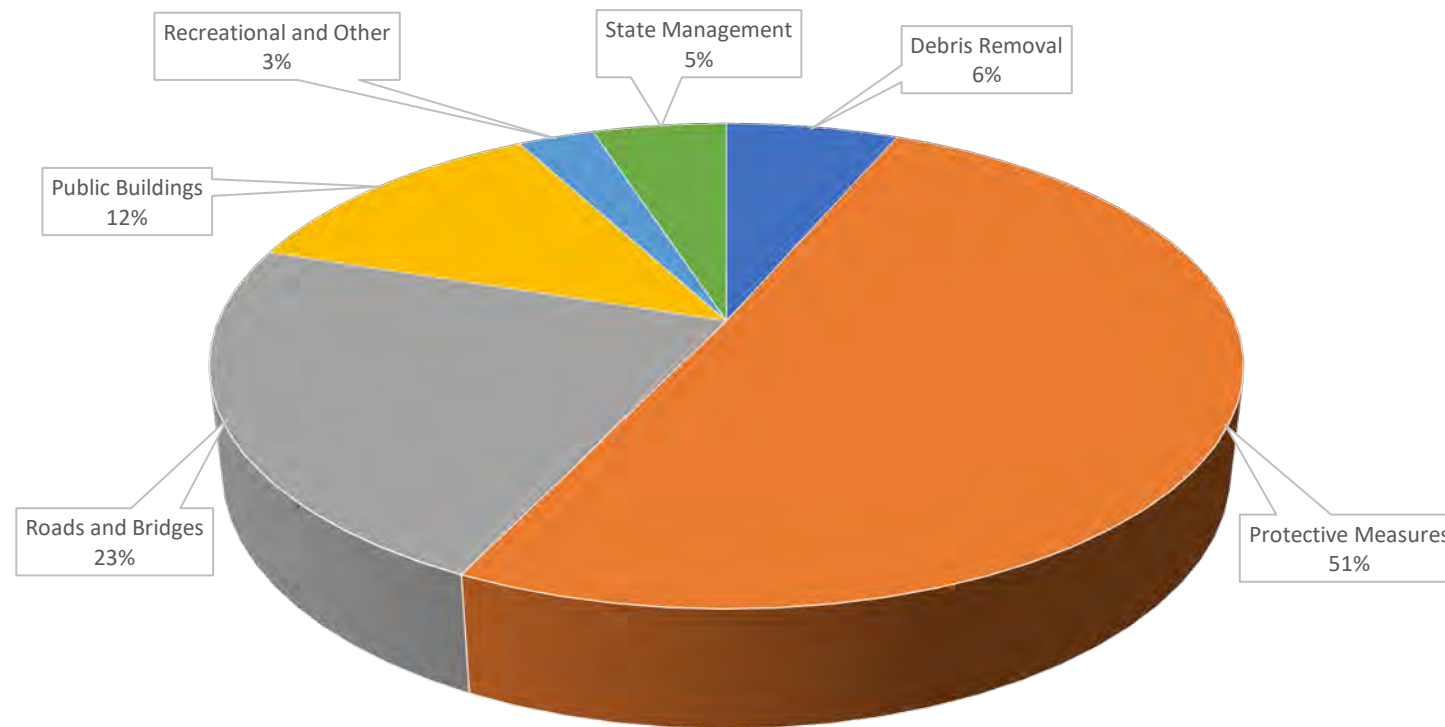
PA Received between
2013 and 2020



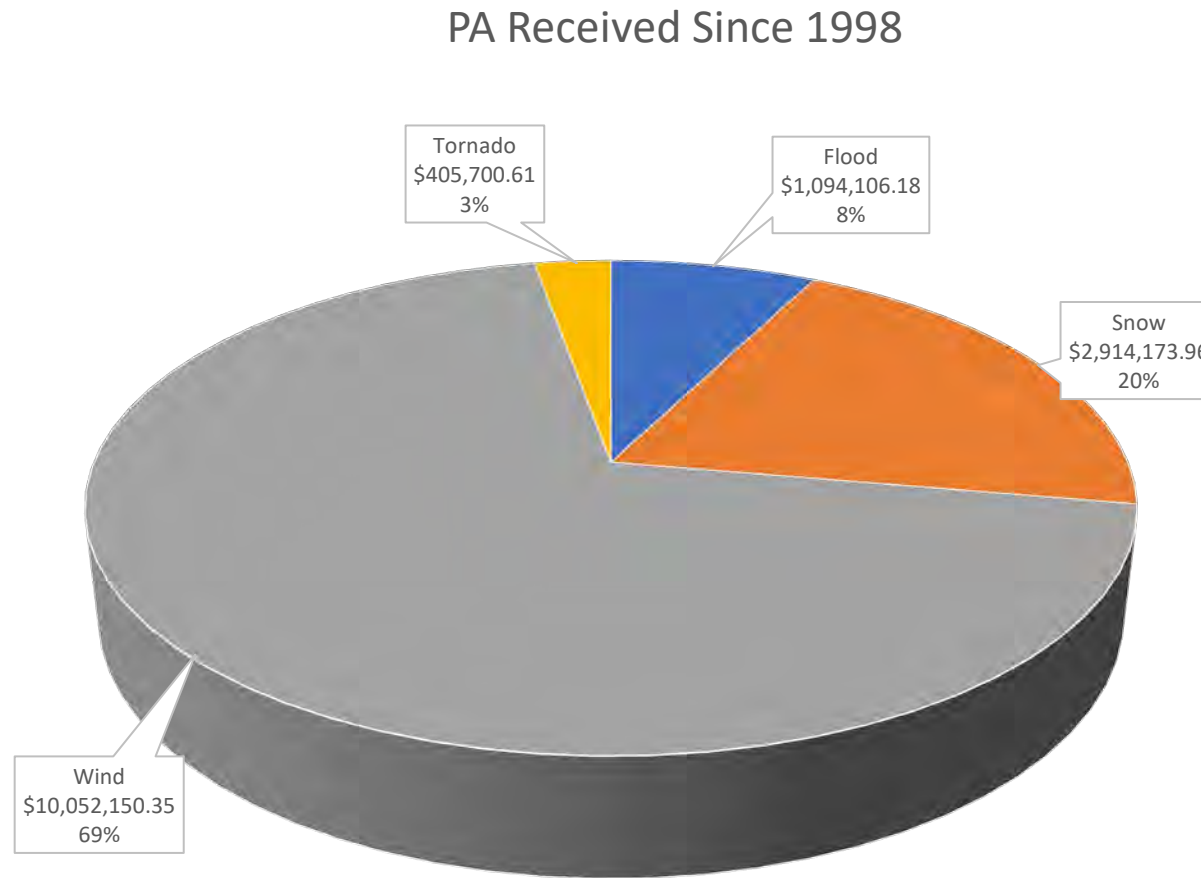
Most PA attributed to winter storms, then tornadoes. Little flood and wind.

FEMA PUBLIC ASSISTANCE (PA) REIMBURSEMENTS

Types of PA Received between 2013 and 2020



FEMA PUBLIC ASSISTANCE (PA) REIMBURSEMENTS



HAZUS LOSS ESTIMATES FROM STATE HMP

- Used for emergency response planning, shelter planning, and utility company preparedness
- Insurance companies may use these models
- Estimated county-wide losses
- Flooding does not include flash flood
- Estimates are typically synonymous with actual losses

100-year flood loss estimations

County	Actual Replacement Value	Building Loss	Contents Loss	Business Interruption	Total Loss	Regional Losses
Fairfield	\$22,118,675	\$1,727,377	\$2,458,298	\$110,802	\$4,274,167	\$299,192
Hartford	\$202,087,968	\$635,753	\$781,849	\$39,849	\$1,447,299	\$57,892
Litchfield	\$46,324,195	\$576,982	\$792,744	\$47,610	\$1,408,816	\$450,821
New Haven	\$195,569,109	\$1,044,654	\$1,369,465	\$60,380	\$2,461,474	\$836,901

HAZUS LOSS ESTIMATES FROM STATE HMP

Estimated total losses for hurricane return periods

County	10-yr	20-yr	50-yr	100-yr	200-yr	500-yr	1,000-yr	Regional Losses for 100-yr
Fairfield	\$0	\$5,381	\$0	\$494,016	\$795,624	\$3,511,912	\$1,998,138	\$19,760
Hartford	\$0	\$14,055	\$11,685	\$558,773	\$950,393	\$1,497,097	\$7,287,319	\$39,114
Litchfield	\$0	\$862	\$0	\$70,962	\$56,906	\$168,713	\$678,390	\$22,708
New Haven	\$0	\$9,844	\$12,063	\$583,958	\$1,269,932	\$3,983,949	\$3,312,166	\$198,546

Estimated building damages per storm scenario statewide

Storm Scenario	None	Minor	Moderate	Severe	Destruction
1938 Unnamed	961,438	201,970	48,961	4,502	2,091
1944 Unnamed	1,218,434	507	27	1	0
Carol	1,217,357	1,503	104	4	1
Donna	1,211,128	7,142	668	26	5
Gloria	1,002,924	17,521	800	38	5

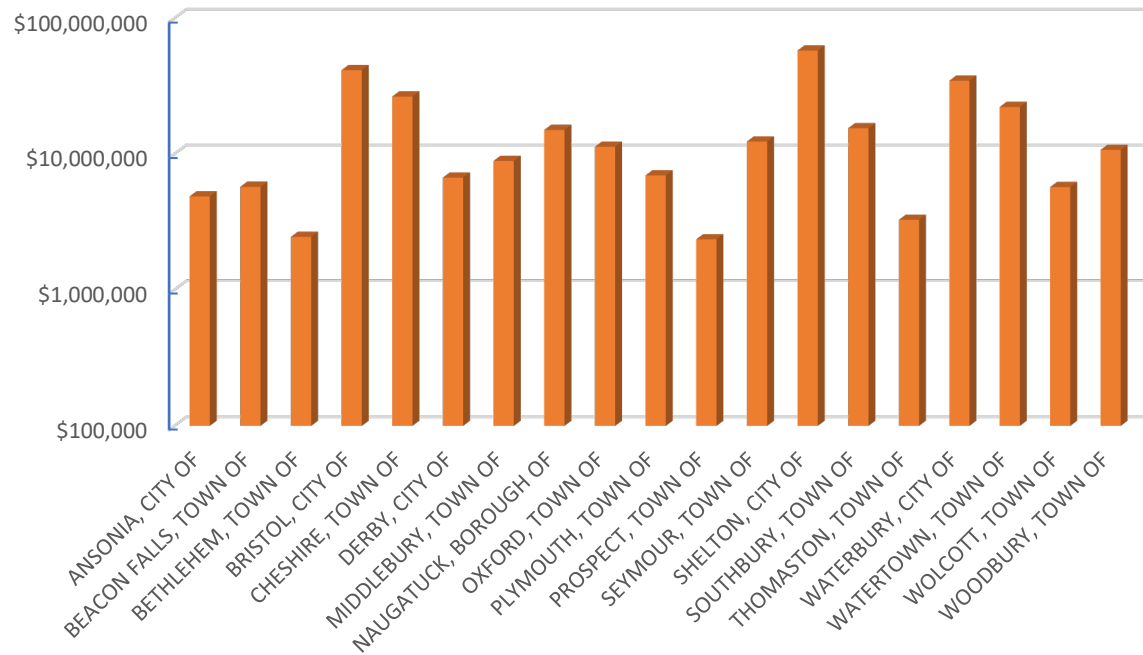
NFIP POLICIES



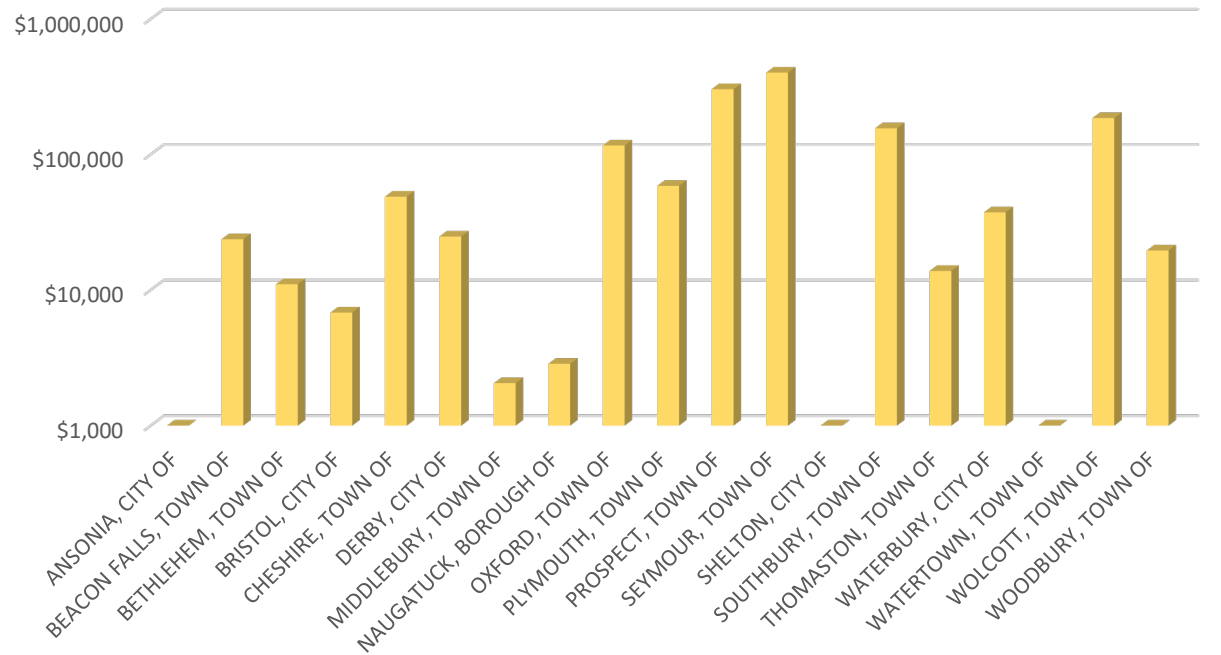
Municipality	Policies in Force	Total Coverage (\$)
Ansonia	18	4,865,900
Beacon Falls	19	5,727,100
Bethlehem	11	2,451,500
Bristol	194	41,452,200
Cheshire	88	26,492,300
Derby	26	6,694,500
Middlebury	36	8,884,700
Naugatuck	93	15,037,300
Oxford	45	11,298,900
Plymouth	26	6,952,700
Prospect	7	2,350,000
Seymour	58	12,340,200
Shelton	244	57,801,200
Southbury	64	15,484,100
Thomaston	8	3,269,900
Waterbury	207	34,647,800
Watertown	83	22,198,500
Wolcott	26	5,702,800
Woodbury	45	10,714,600

NFIP POLICIES AND LOSSES PAID

NFIP Insurance in Force



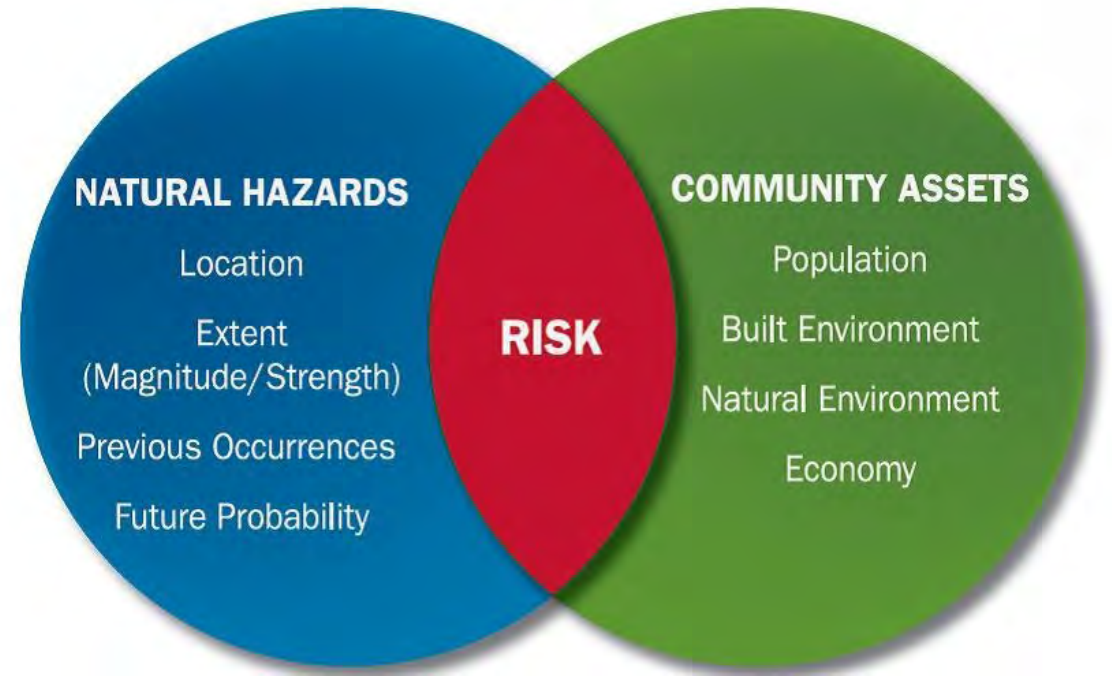
NFIP Total Losses Paid Since 1978



WHAT IS AT RISK?

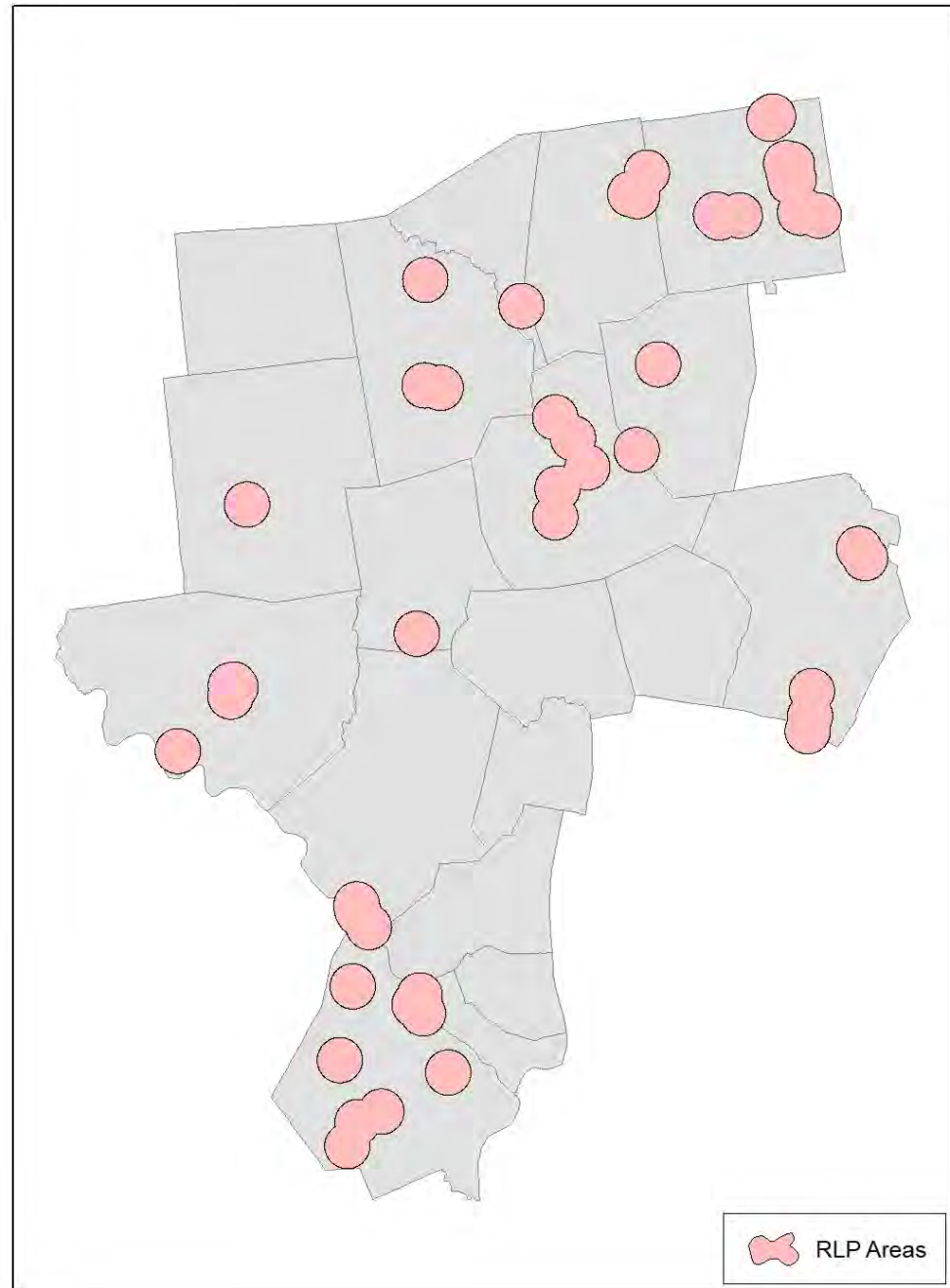
- Repetitive Loss (RL) properties and properties near them
- Historic and Cultural Resources
- Critical Facilities
- *As well as the built environment and people at large*

Overall – infrastructure, residential and commercial properties, utilities

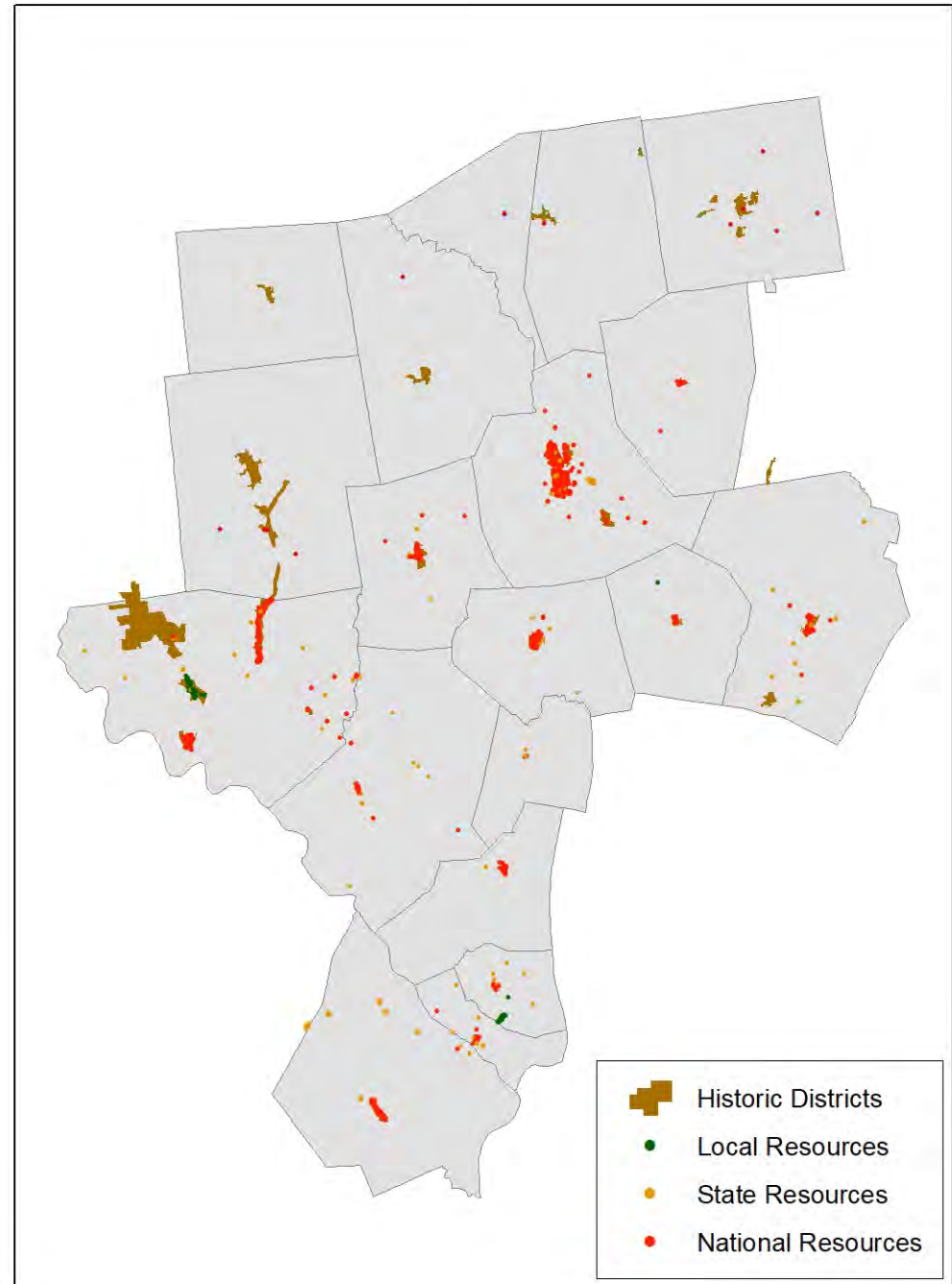


Source: FEMA, Local Hazard Mitigation Handbook

REPETITIVE LOSS PROPERTIES



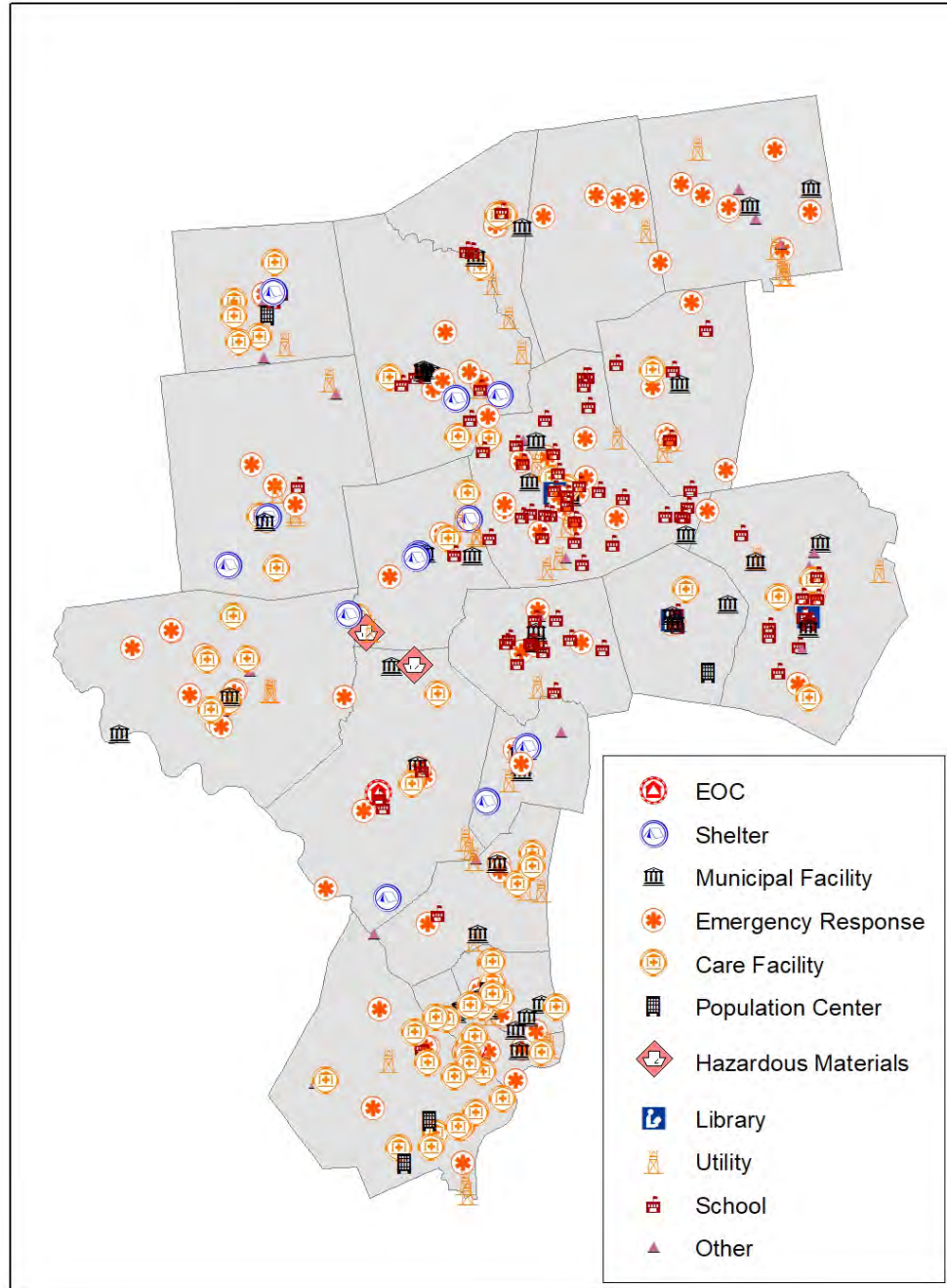
HISTORIC RESOURCES



CRITICAL FACILITIES

Critical facility updates and changes are made based on feedback during municipal meetings. These include

- EOC
- Police
- Fire
- Shelters
- Municipal buildings
- Care facilities
- Hospitals
- Schools
- Other facilities that are critical to emergency response





Connecticut Department of Energy and Environmental Protection



Connecticut Department of
**ENERGY &
ENVIRONMENTAL
PROTECTION**

Naugatuck Valley Council of Government (NVCOG)

Regional Natural Hazard Mitigation Plan Update - Mapping Projects

November 18, 2020 (9:00-10:30am, municipal)

Diane Ifkovic, State NFIP Coordinator



Connecticut Department of Energy and Environmental Protection



- NVCOG is comprised of 19 communities
- Four Connecticut Counties – New Haven, Litchfield, Fairfield, Hartford
- Four Major Watersheds – Quinnipiac, Saugatuck, Farmington, Housatonic Rivers



Evolution of FEMA Flood Maps

- Individual Community Maps (joined NFIP 1978 to 1990)
- Countywide Maps (2008-2010)
 - New Haven County – December 17, 2010
 - Hartford County (Bristol) – September 26, 2008
 - Fairfield County (Shelton) – June 18, 2010
 - Litchfield County – No countywide update
Bethlehem, Plymouth, Thomaston, Watertown, Woodbury
- Levee Updates (July & October 2013) Ansonia, Derby
- Watershed (2015 to present)
 - Quinnipiac River Watershed – May 16, 2017
Ansonia, Bristol, Cheshire, Derby





Flood Map Updates in the NVCOG Region

1. Saugatuck River Watershed
2. Farmington River Watershed
3. Housatonic River Watershed



Connecticut Department of Energy and Environmental Protection

Saugatuck River Watershed (20 communities)

- NVCOG 1 Community Included:
Shelton
- FEMA Mapping Contractor: U.S. Geological Survey (USGS)



Saugatuck River Watershed

- Discovery meetings were held June 7, 2016
- Field surveying was completed in summer 2018
- Enhanced hydraulics completed
- Floodplain mapping nearing completion
- Work maps will be issued soon to communities
- **Work Map meetings (webinars) January/February 2021**



Farmington River Watershed (24 communities)

- NVCOG 3 Communities Included:
Bristol, Plymouth, Wolcott
- FEMA Mapping Contractor: Compass



Farmington River Watershed

- Discovery meetings were held September 25, 2018
- Field surveying was completed in summer 2019
- Discovery Report was issued end of May 2020
- Work Map meetings (webinars) held July 21 & 22, 2020
- One-on-one community meetings held Aug. 3 & 11, 2020
- Comment period for work maps ended August 22, 2020
- Preliminary flood maps and study early summer 2021
- Letter of Final Determination (LFD) December 2022
- Towns update local floodplain regs/ordinance early 2023
- Final effective maps and studies projected summer 2023



Housatonic River Watershed (54 communities)

- All NVCOG 19 Communities Included:
Ansonia, Beacon Falls, Bethlehem, Bristol,
Cheshire, Derby, Middlebury, Naugatuck,
Oxford, Plymouth, Prospect, Seymour,
Shelton, Southbury, Thomaston, Waterbury,
Watertown, Wolcott, Woodbury
- FEMA Mapping Contractor:
U.S. Geological Survey (USGS)



Housatonic River Watershed

- Discovery meetings held May 2017
- Field surveying has begun
- Selection of priority stream reaches is complete and includes Torrington levee project
- There will be a 30-day comment period for stakeholders on the model used for this map project but this had been delayed due to the pandemic





What should you be aware of with these projects?

1. Pay attention to correspondence from FEMA/mapping contractors and important dates/milestones.
2. Provide feedback when asked, this is your chance to make changes to the map and get FEMA to pay for it.
3. When final maps go effective, town is required to update local floodplain zoning regulations or ordinance or be suspended from the NFIP (hinders home sales)



Ice Jams and Climate Change

- FEMA flood maps do not contain flood risk information on ice jam flooding or climate change
- Ice jams were a problem in January 2018 on Housatonic River, especially in Kent
- Inland areas seeing effects of climate change with “rain bombs”, extreme precipitation events
- This type of changing rain pattern can have more adverse effects in hilly areas due to increased flash flooding or new areas experiencing flooding (urban/rural)
- CTDOT using Northeast Regional Climate Center (Cornell) extreme precipitation analyses and data





Questions?

Diane Ifkovic

Email: diane.Ifkovic@ct.gov

(860) 424-3537



Connecticut Department of Energy and Environmental Protection

BREAKOUT ROOMS



Riverine and
Dam Flood
Risks



Wind, Snow,
and Power
Outages



Geologic
Hazards
(Landslides,
Earthquakes,
and
Sinkholes)

NEXT STEPS

- Complete any outstanding municipal planning meeting or coordination
- Review meeting notes as they have been distributed and provide edits to notes, previous actions or critical facilities list
- Outreach and public involvement
 - **Online Survey is OPEN**
 - **Conduct public meetings**
- Workshop to discuss mitigation strategies and actions

NVCOG Natural Hazard Mitigation Plan

- Hazard Mitigation Planning
- Floods & Dam Failures
- Storms
- Geologic Hazards
- Wildfires
- Take A Survey
- Report It

The Hazard Mitigation Plan

The Naugatuck Valley Council of Governments has enlisted the help of Milone & MacBroom, Inc. to prepare a multi-jurisdictional Natural Hazard Mitigation Plan for all member towns including:

- ANSONIA • BEACON FALLS • BETHLEHEM • BRISTOL • CHESHIRE • DERBY • MIDDLEBURY • NAUGATUCK • OXFORD • PLYMOUTH • PROSPECT • SEYMOUR • SHELTON • SOUTHBRURY • THOMASTON • WATERBURY • WATERTOWN • WOLCOTT • WOODBURY •

Funding for the update comes from the Federal Emergency Management Agency (FEMA) Pre-Disaster Mitigation grant program.

So, what is a natural hazard?

A natural hazard is an extreme natural event that poses a risk to people, infrastructure, and resources.

What is hazard mitigation?

Actions we take now that reduce or eliminate long-term risk to people, property, and resources from natural hazards and their effects.

The plan is developed with the primary goals of:

- Reducing economic losses, property damage, and loss of life by identifying implementable strategies to mitigate natural hazard impacts.
- Educating residents and policy-makers.
- Connecting hazard mitigation planning with other municipal planning efforts.
- Enhancing and prioritizing natural resource systems in the community.