

State of Minnesota
House Capital Investment Hearing
February 2, 2021

Managing Risk to Infrastructure



PERKINS+WILL

DOUG PIERCE AIA, LEED FELLOW, RELI AP
Resilient Design Director, Architect
Perkins+Will

Adjunct Professor in Practice Univ. of Minnesota





Great River Energy – First Minnesota LEED Platinum



St. Louis County GSC High-Performance Renovation – SB2030 . Pioneering use of VRF + LED Lighting



Bell Museum – SB2030 . Restorative Water . Bird Safe







CLIMATE READY DC

The District of Columbia's Plan to Adapt to a Changing Climate


100 Resilient Cities and 8 others follow

Mayor Muriel Bowser @MayorBowser · 5 Dec 2017

Our #ClimateReadyDC plan has made long-term commitments to climate resiliency and established our city as a climate leader. On behalf of Washington, DC, I want to thank @C40Cities and @BloombergDotOrg for presenting us with the #Cities4Tomorrow award! #C40Awards




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CLIMATE RISKS AND VULNERABILITIES

Based on the projected changes in temperature, rainfall, and sea level rise, DOE and our technical experts conducted an assessment of the risks that these changes are likely to pose for DC's infrastructure, our community resources and facilities, and our residents. We developed planning scenarios for heat waves, heavy rain events, rising sea levels, and flooding in order to identify and rank the areas at greatest risk. The rankings were developed with input from District agencies and external stakeholders. They are based on both the probability of critical infrastructure, community resources, and other assets being exposed to a climatic hazard event and the potential impact of that exposure on the functionality and usability of the District. The areas with the most assets and people at risk were identified as priority areas for the implementation of Climate Ready DC.

The following section summarizes the key findings from each area of the assessment. The maps below demonstrate the projected risk: extreme heat and flooding post to the city's infrastructure and community resources in 2020, 2050 and 2080.



The District of Columbia's Plan to Adapt to a Changing Climate

ADAPTATION STRATEGIES

While the risks that DC faces due to climate change are significant, there are also many actions that we can take to manage those risks and adapt to our changing climate. Many of these actions are already underway.

The following section outlines the action plan for a Climate Ready DC. The plan is organized into four sectors: Transportation & Utilities, Buildings & Development, Neighborhoods & Communities, and Governance & Implementation. For each sector we have established goals, targets, and specific actions. The goals and targets are outlined in this section, and a full summary of all the actions is provided at the end of this document. A key first step in realizing Climate Ready DC will be the development of a detailed implementation plan that will identify timelines, potential funding sources, and metrics for tracking our progress.

Transportation & Utilities

Goal: Improve transportation and utility infrastructure in order to maintain viability during periods of extreme heat, severe weather, and flooding.

Climate change will further threaten DC's aging infrastructure. The District will work with the public and private operators of our transportation, water and sewer, energy and communication infrastructure to improve and adapt these systems to withstand the impacts of climate change in order to maintain service and recover quickly from outages. Through better planning and coordination, we can take advantage of ongoing investments and upgrades to our infrastructure to advance resilience. Climate Ready DC identifies five targets for the Transportation & Utilities section:

1. Develop site-level adaptation plans for all critical facilities and service areas identified as at risk from sea level rise and flooding.

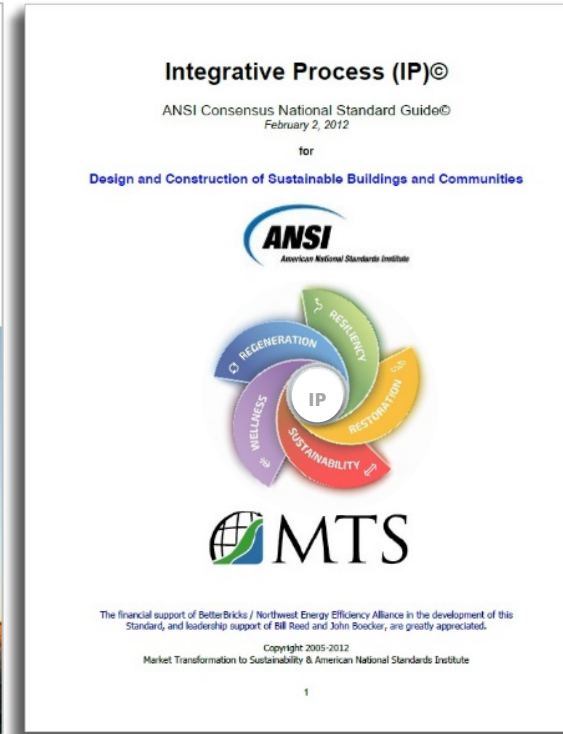
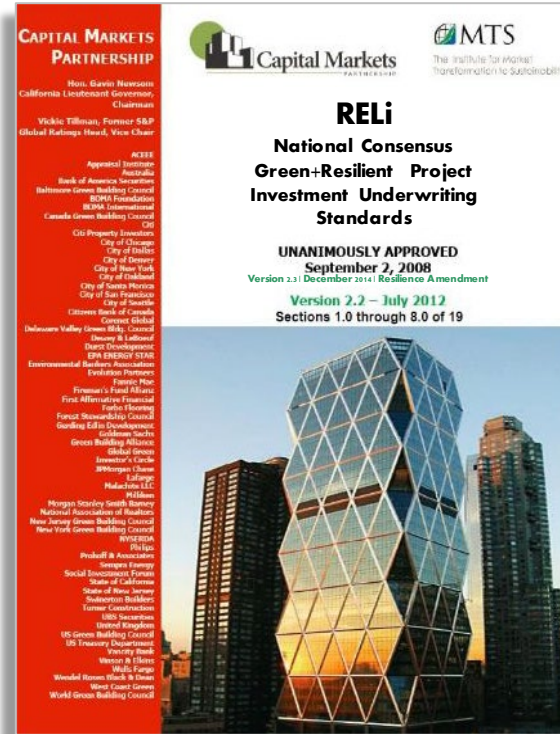
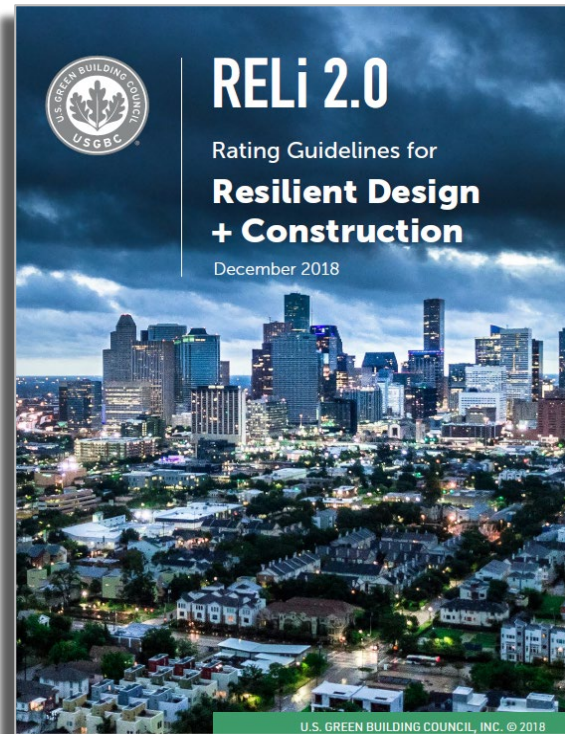
The risk assessment conducted by the Climate Ready DC team identified numerous infrastructure assets at risk to flooding. Site-level assessments would be necessary to identify potential flood-proofing strategies that could be incorporated into capital improvement plans. Metro and DC Water are already investing in flood-proofing several critical elements of their systems, but those efforts need to be expanded to other critical facilities and service areas.

#	Action (sub-action)	Climate Risks	Lead (s)	Partners	Timeframe
15	Evaluate vertical clearance for bridges on waterways based on sea level rise projections.	Sea Level Rise	DDOT	FEMA	Medium
NEIGHBORHOODS & COMMUNITIES					
Goal: Upgrade existing buildings and design new buildings and development projects to withstand climate change impacts.					
Goal: Provide back-up power for emergencies at identified critical facilities. Ensure that existing back-up power systems are located above projected flood elevations.					
BD-6.1	Evaluate the need for critical facilities to identify those with or without existing back-up power systems. Determine if they are above flood elevations, in good working order, and provide the appropriate capacity for that facility type.	All	HSEMA	DOE, DOEE	Medium
BD-6.2	Floodproof the most critical facilities to protect against future events according to sea-level rise and increasing severe precipitation events.	Flooding, Sea Level Rise	DOE	HSEMA, DOEE	Long
BD-7	Improve thermal safety: reduce building temperatures to increase resilience to extreme heat, especially in the event of power outages.	Extreme Heat	DOEA	DOEE, DCH	Short
BD-7.1	Incorporate recommendations and requirements for increasing thermal safety in residential and building codes through the use of passive cooling strategies.	Extreme Heat	DOEE	DOEA, DCMA, DCDA	Medium
BD-7.2	Identify existing residential building typologies (e.g. high rises, garden style) where residents are at highest risk during extreme heat events and develop actions to support and encourage retrofits and upgrades.	Extreme Heat	DOEE	DOEA, DCMA, DCDA	Short
BD-7.3	Launch existing incentive programs to reduce thermal safety and urban heat island mitigation measures such as cool roofs, solar shading, and shade trees.	Extreme Heat	DOEE	DCDA	Medium
BD-7.4	Evaluate the public housing portfolio for vulnerability to extreme heat and flooding and incorporate resilience in future improvement plans.	Extreme Heat, Flooding, Extreme Precipitation	DOEA	DOEE	Short
BD-8.0	Pursue deep energy and water efficiency for all buildings.	Extreme Heat	DOEA	DOEE, DCSEU	Short
BD-8.1	Continue to pursue energy efficiency for all commercial and residential buildings through incentive programs, building codes, and financing to increase grid stability by reducing energy demand at peak periods and during extreme events.	Extreme Heat	DOEA	DOEE, DCSEU	Short
BD-8.2	Consider developing a post-occupancy energy optimization and retro-commissioning program for new and existing buildings to provide training and incentives to ensure the actual efficiency potential of new buildings is realized.	Extreme Heat	DOEE	DOEA, DCSEU	Medium
BD-8.3	Develop incentives, training and technical assistance programs for significant water use reductions including computer and printer water saving and water barometer treatment.	Extreme Precipitation	DOEE	DC Water, DCRA, DDOT	Medium
BD-9	Develop climate resilience into development planning and review processes.				

Climate Ready DC | 2017 C40 Cities / Bloomberg Philanthropies "Cities4Tomorrow" International Award RELi Inspired Climate Adaptation Plan

Framing Resilience for Design

RELi Resiliency Action List



3 Separate Standards

- RELi Action List
- Integrative Process
- Finance Standard

Bonds

Mortgages

Credit Rating
downgrades
are coming



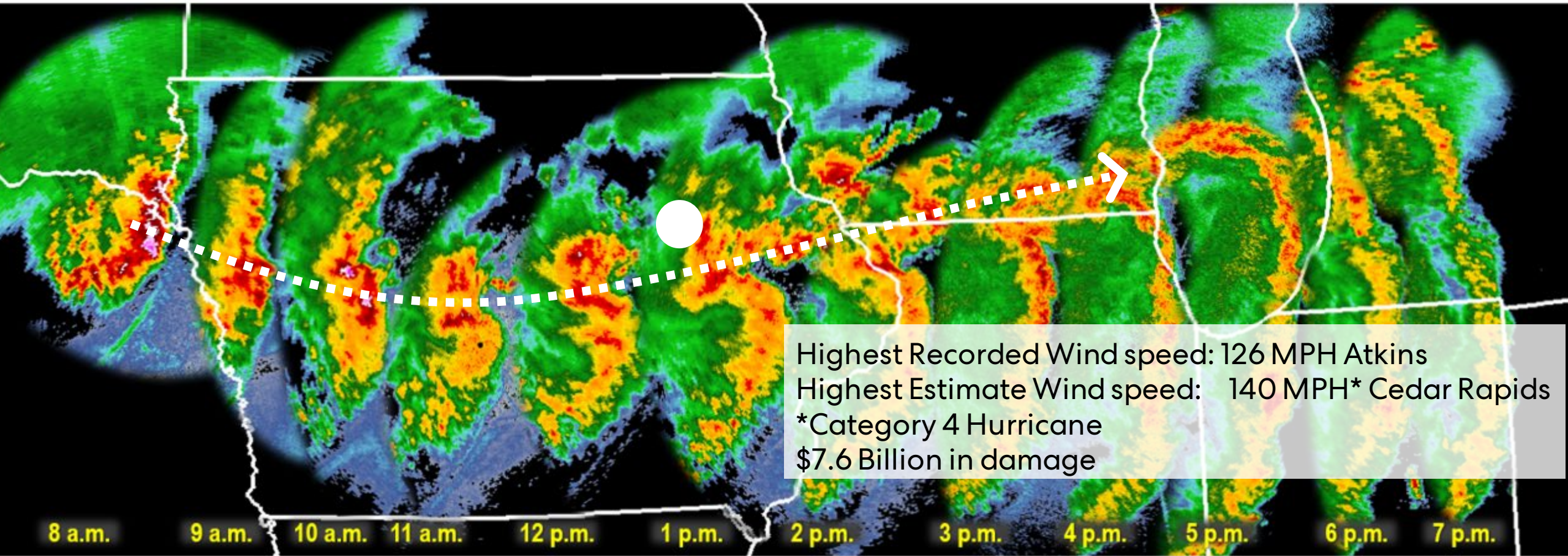
Miami Beach, Florida – Sea Level Rise Adapted Codes – 2020 through 2130



Christus Spohn Medical Center, Corpus Christi, Texas – Hurricane Ready

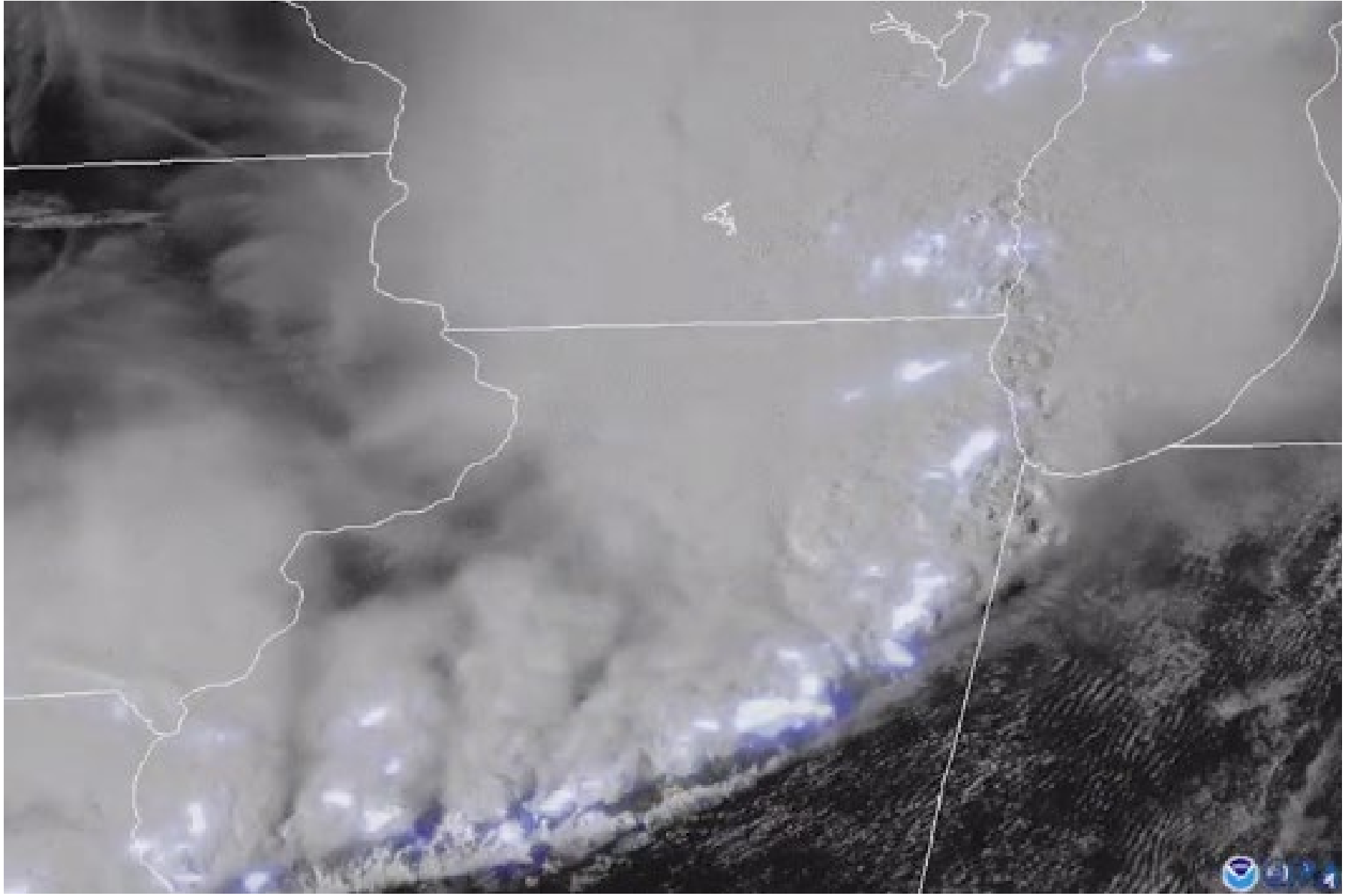
August 10, 2020 Derecho: Lowest Angle NWS Radar Reflectivity at One-Hour Time Steps

All times in CDT

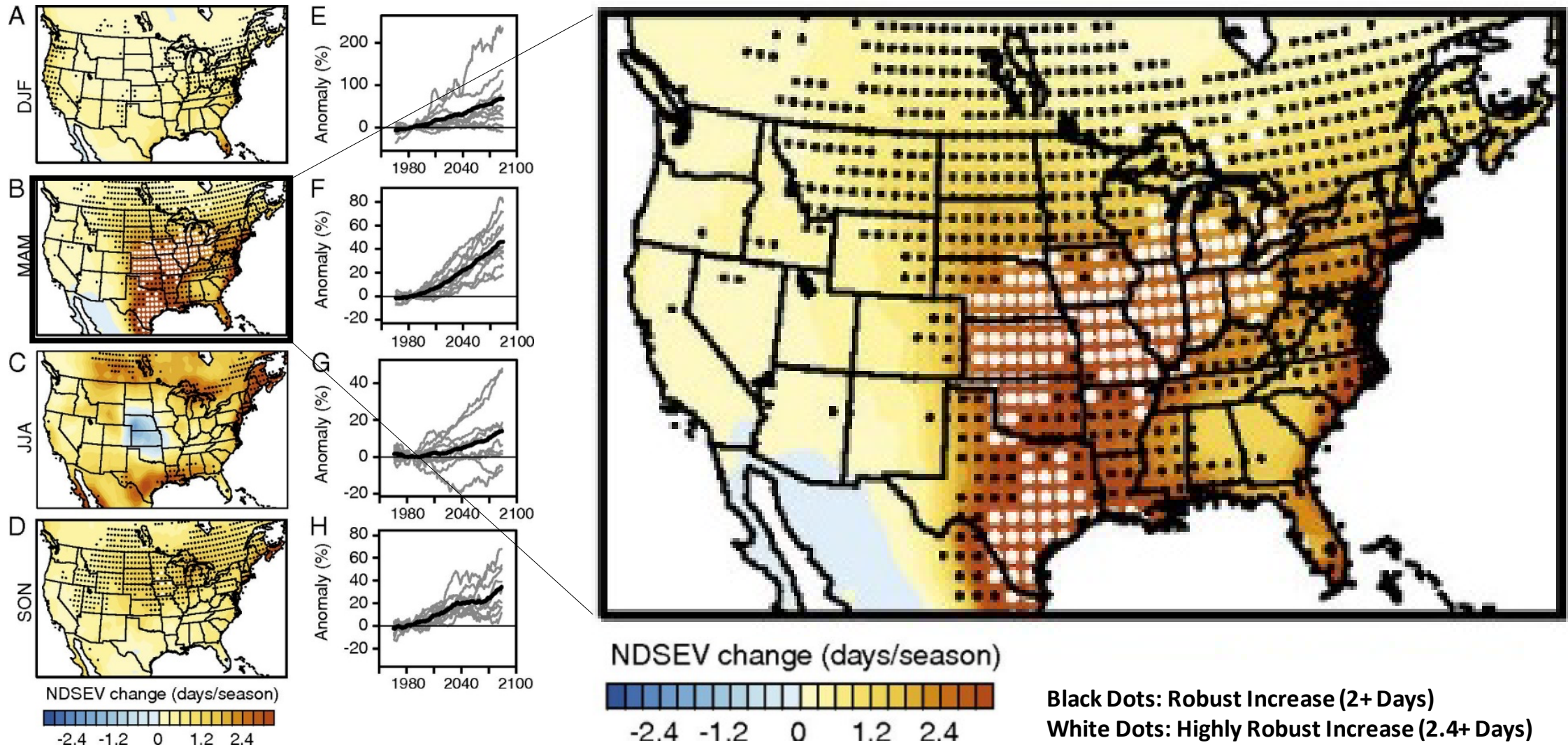


Highest Recorded Wind speed: 126 MPH Atkins
Highest Estimate Wind speed: 140 MPH* Cedar Rapids
*Category 4 Hurricane
\$7.6 Billion in damage

This long-lasting, severe wind thunderstorm complex (known as a derecho) produced hundreds of reports of damage along with likely a few tornadoes.



THUNDERSTORM + TORNADO POTENTIAL








©2013 by National Academy of Sciences

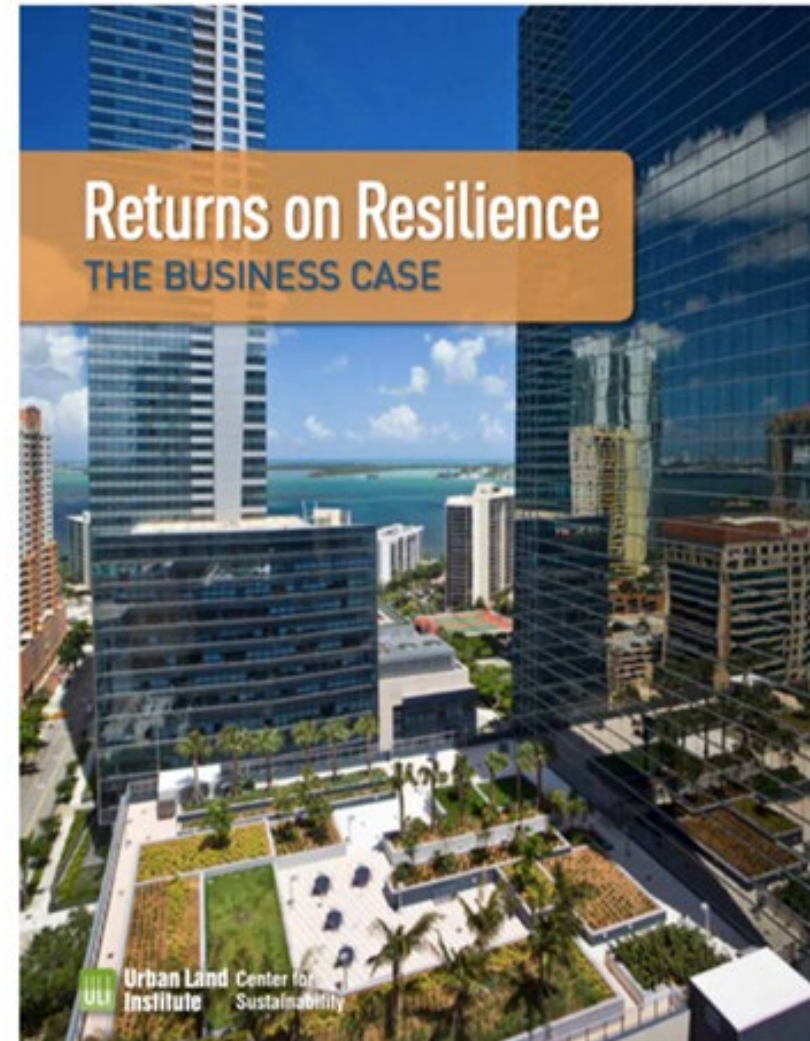
Response of severe thunderstorm environments in the late
21st century period of RCP8.5





Hazard Cost Benefit Ratio for Investments

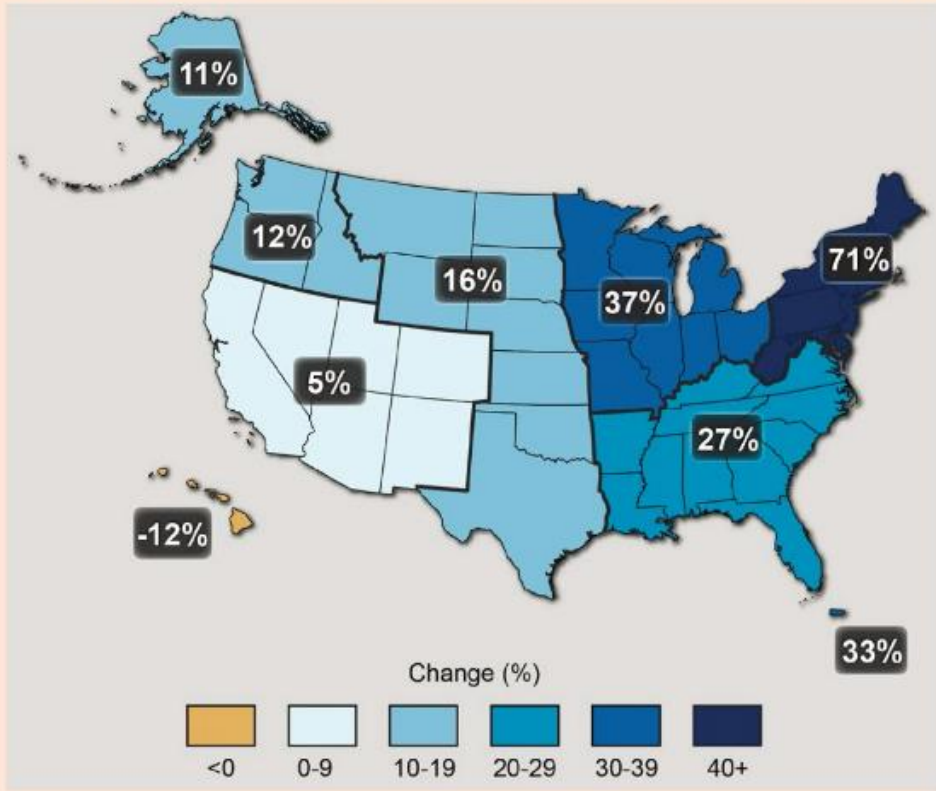
National Benefit-Cost Ratio Per Peril <small>*BCR numbers in this study have been rounded</small>		Federally Funded	Beyond Code Requirements
Overall Hazard Benefit-Cost Ratio		6:1	4:1
 Riverine Flood		7:1	5:1
 Hurricane Surge		Too few grants	7:1
 Wind		5:1	5:1
 Earthquake		3:1	4:1
 Wildland-Urban Interface Fire		3:1	4:1



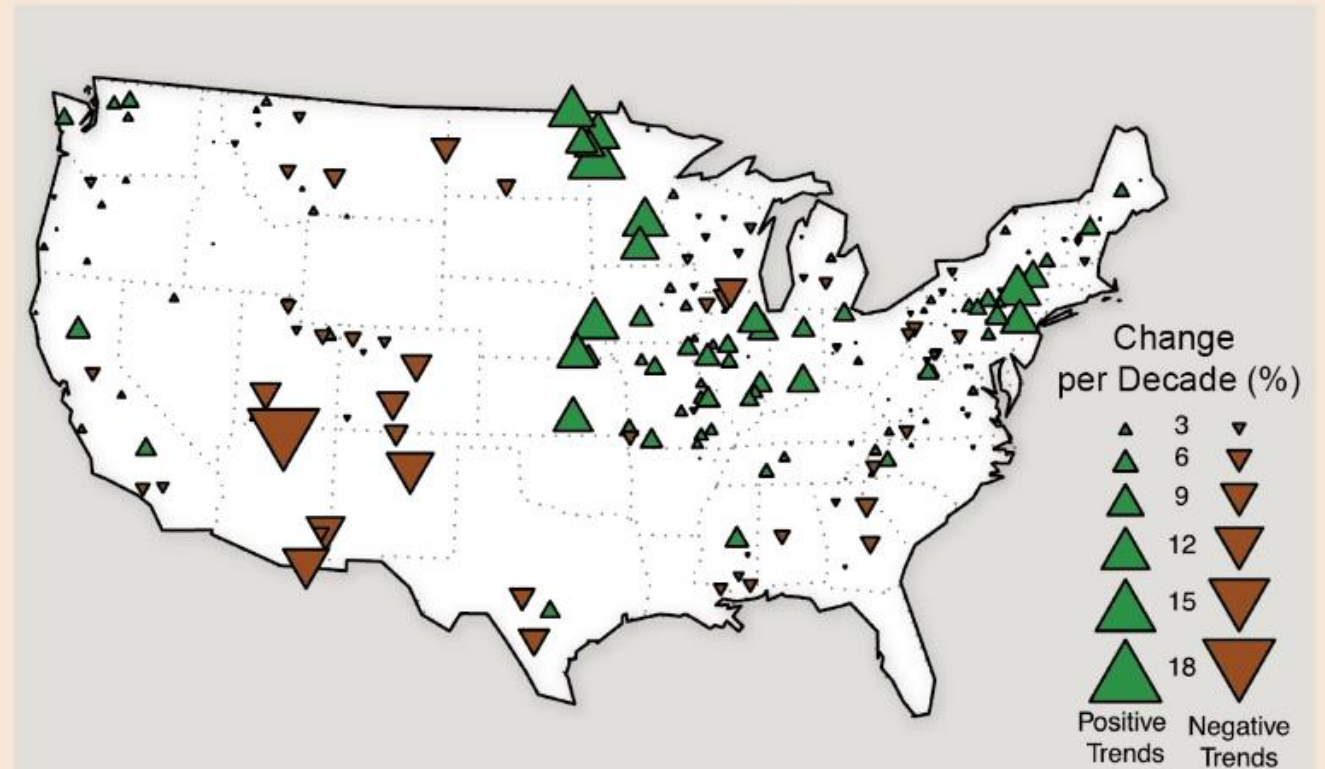
Source: Multihazard Mitigation Council National Institute of Building Science; Urban Land Institute

Extreme Rain + Flooding

Observed Change in Very Heavy Precipitation



Trends in Flood Magnitude



Extreme Rain EVENTS

MPR
news

Timeline of Minnesota's historic mega-rain events 1866-2014



1866-1965

Four mega-rains
in 100 years

Aug. 6, 1866

Killed 16 people in Fillmore County.

July 17-19, 1867

Known as the state's greatest flash flood, in central Minnesota.

July 20-22, 1909

Extensive across northern Minnesota, killed 2 children in Duluth.

September 9-10, 1947

More than 8 inches in five hours at Hibbing.

1966-1999

Three mega-rains
in 33 years

July 21-22, 1972

Nearly 11 inches in 24 hours at Ft. Ripley, state record at the time.

June 28-29 and July 1-2, 1975

Intense rain in northwestern Minnesota in two events.

July 23-24, 1987

9 inches at Minneapolis-St. Paul International Airport, a record.

2000-2014

Five mega-rains
in 14 years

June 9-10, 2002

More than 12 inches in 48 hours in northern Minnesota.

Sept. 14-15, 2004

More than 10 inches in 36 hours in Faribault and Freeborn counties.

Aug. 18-20, 2007

15 inches near Hokah, state record for 24 hours.

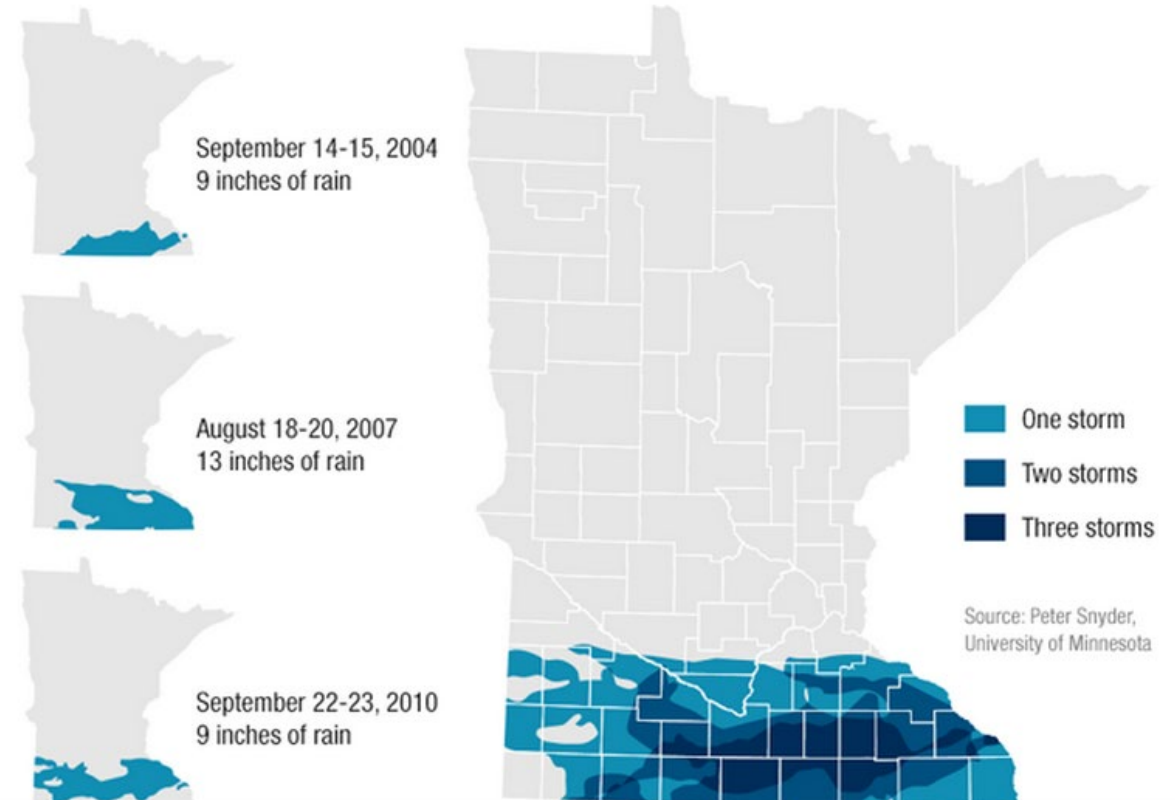
Sept. 22-23, 2010

More than 10 inches at Amboy.

June 19-20, 2012

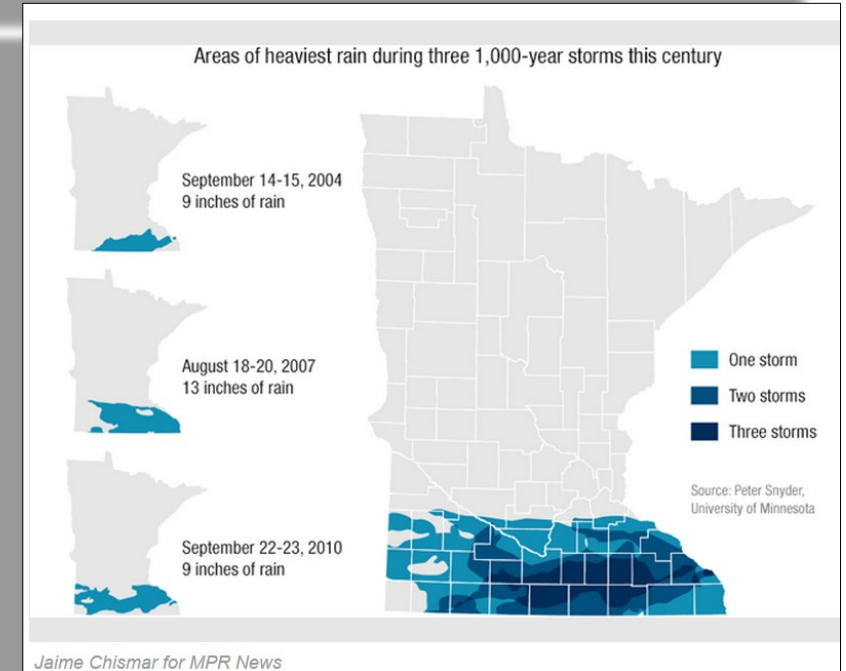
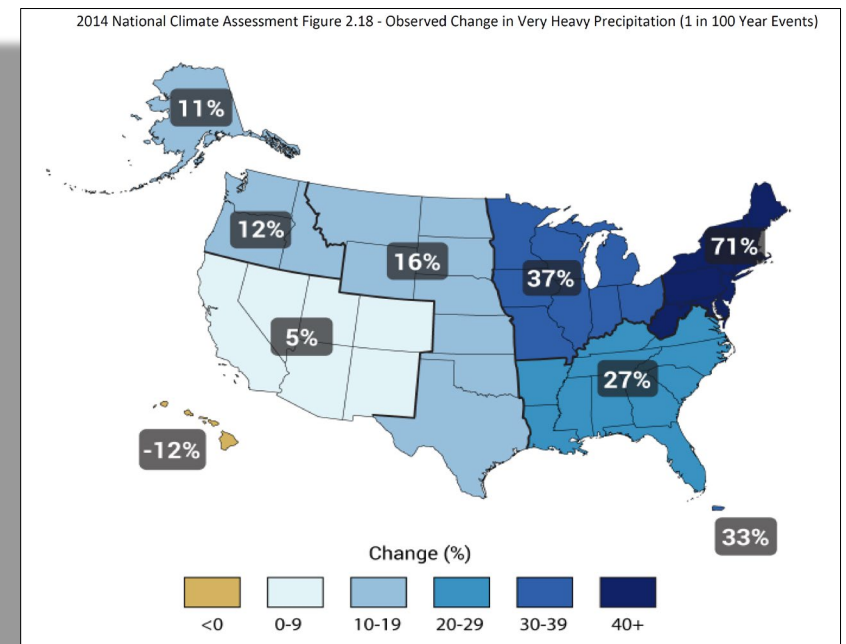
7 inches in two days in Duluth, St. Louis River at record level.

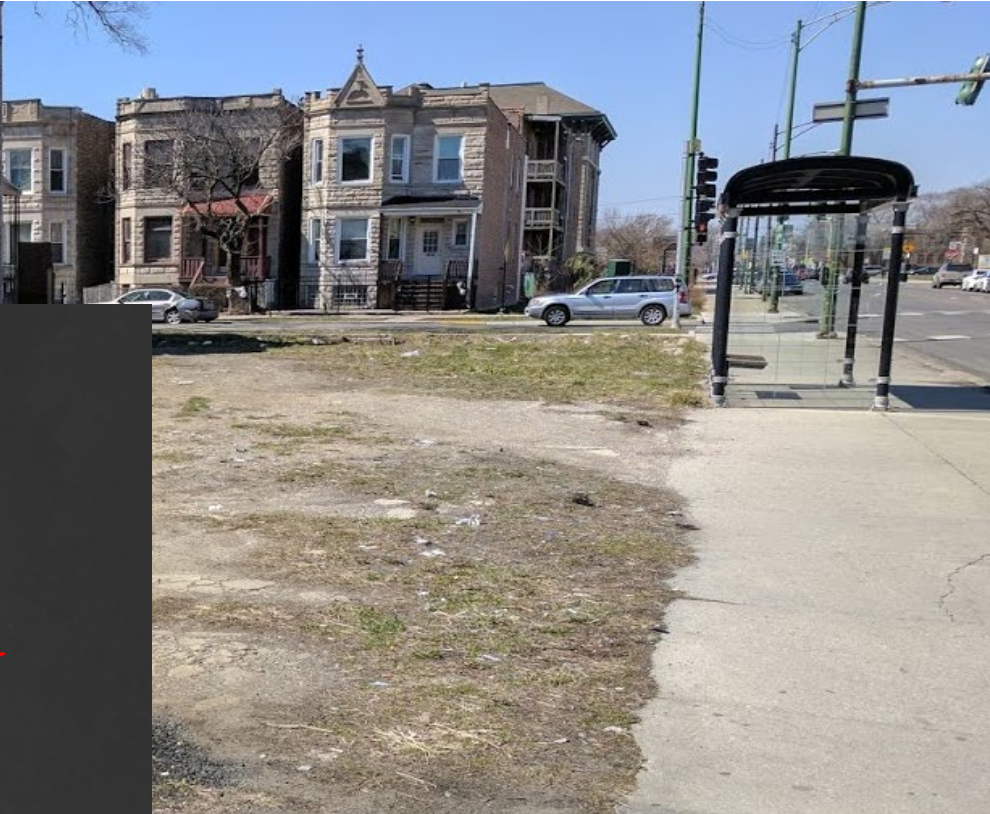
Areas of heaviest rain during three 1,000-year storms this century



Jaime Chismar for MPR News







Engineering Data

		TP40/Atlas 14 Storm Event Rainfall Forecast (Years from 2016)				
24 Hour - Frequency (year)	2013 Atlas 14 Rainfall (inches)	10	20	30	40	50
100	7.5	7.89	8.28	8.67	9.06	9.45

Minnesota Public
Radio Article

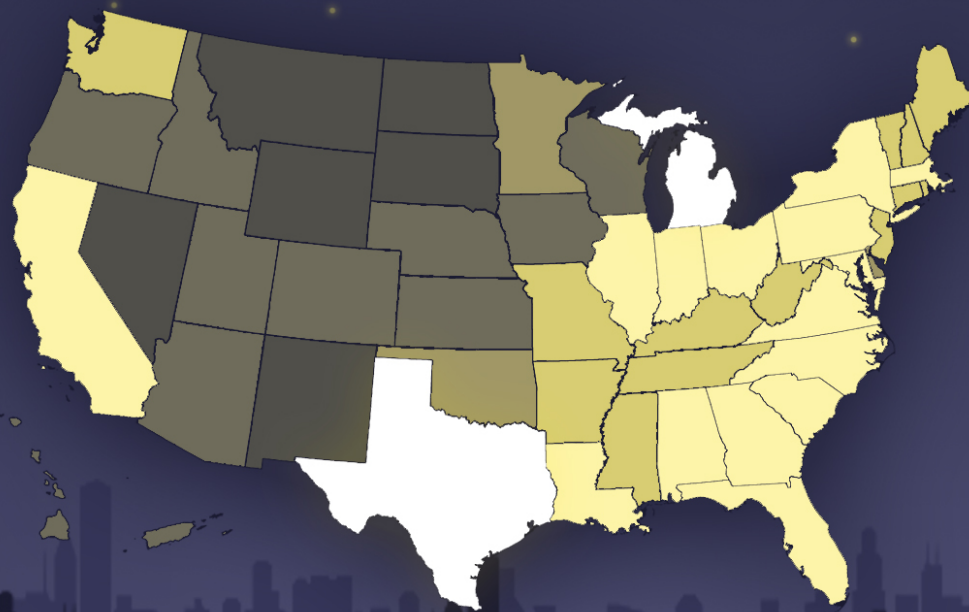
		MPR News Article Storm Event Rainfall Forecast (Years from 2013)				
24 Hour - Frequency (year)	2013 Atlas 14 Rainfall (inches)	10	20	30	40	50
100	7.5	7.83	8.17	8.50	8.83	9.17

National Climate
Assessment

		<u>GlobalChange.gov</u> Report Storm Event Rainfall Forecast (Years from 2016)				
24 Hour - Frequency (year)	2013 Atlas 14 Rainfall (inches)	10	20	30	40	50
100	7.5	8.53	8.53	9.04	9.56	10.07

WEATHER-RELATED POWER OUTAGES SINCE 2000

0 10 20 40 80



Number of outages affecting more than 50k customers
Source: US Department of Energy Form OE-417

CLIMATE  CENTRAL

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Thank You! Questions?



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Resilient Design Director, Architect
Perkins&Will
Adjunct Professor in Practice Univ. of Minnesota