Building Resilient Infrastructure and Communities (BRIC) and Nature-Based Solutions

July 29, 2020

Photo of Memphis, Tennessee

FEMA

Photo of Miami, Florida

Agenda

- **Where Nature-Based Solutions and Future Conditions Fit into BRIC:**
  Camille Crain, FEMA
- **Future Conditions:**
  Art von Lehe, FEMA

  Adam Stein, NOAA
- **Nature-Based Mitigation:**
  Abby Hall, EPA

  Sarah Murdock, The Nature Conservancy

  Chad Berginnis, ASFPM

Nature-Based Solutions

- Can support natural hazard risk mitigation
- Can provide economic, environmental, and social resilience benefits

Examples:

- Restoration of grasslands, rivers, floodplains, wetlands, dunes, reefs
- Living shorelines
- Soil stabilization
- Bioretention systems

Future Conditions

Examples:

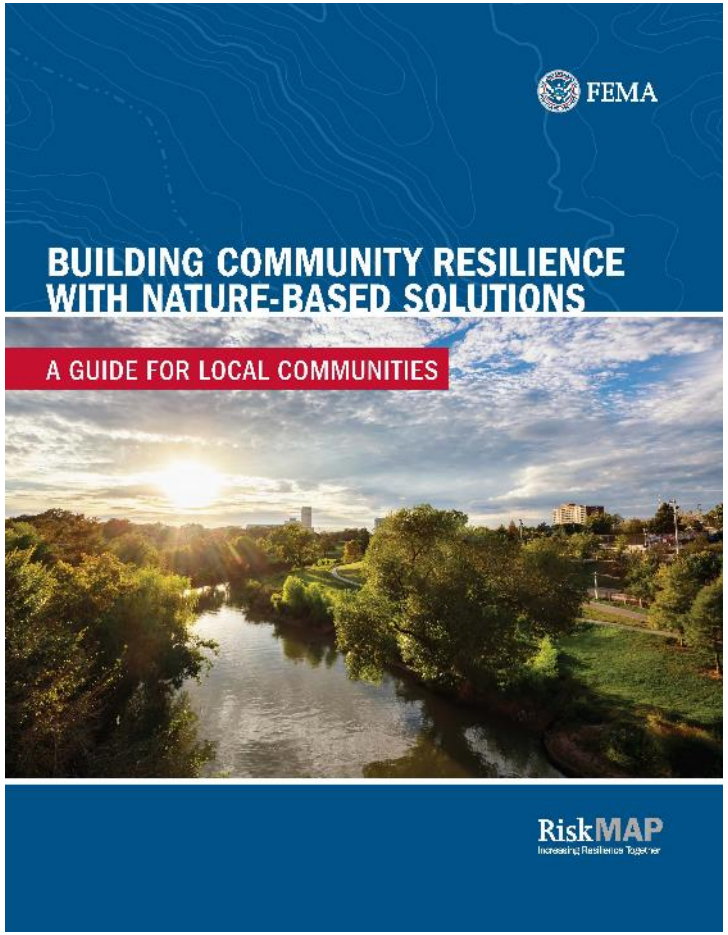
Population changes

Demographic changes

Climate changes

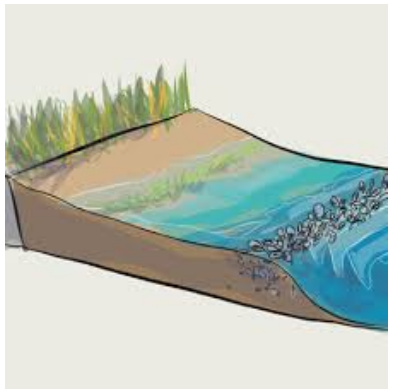
Land use changes

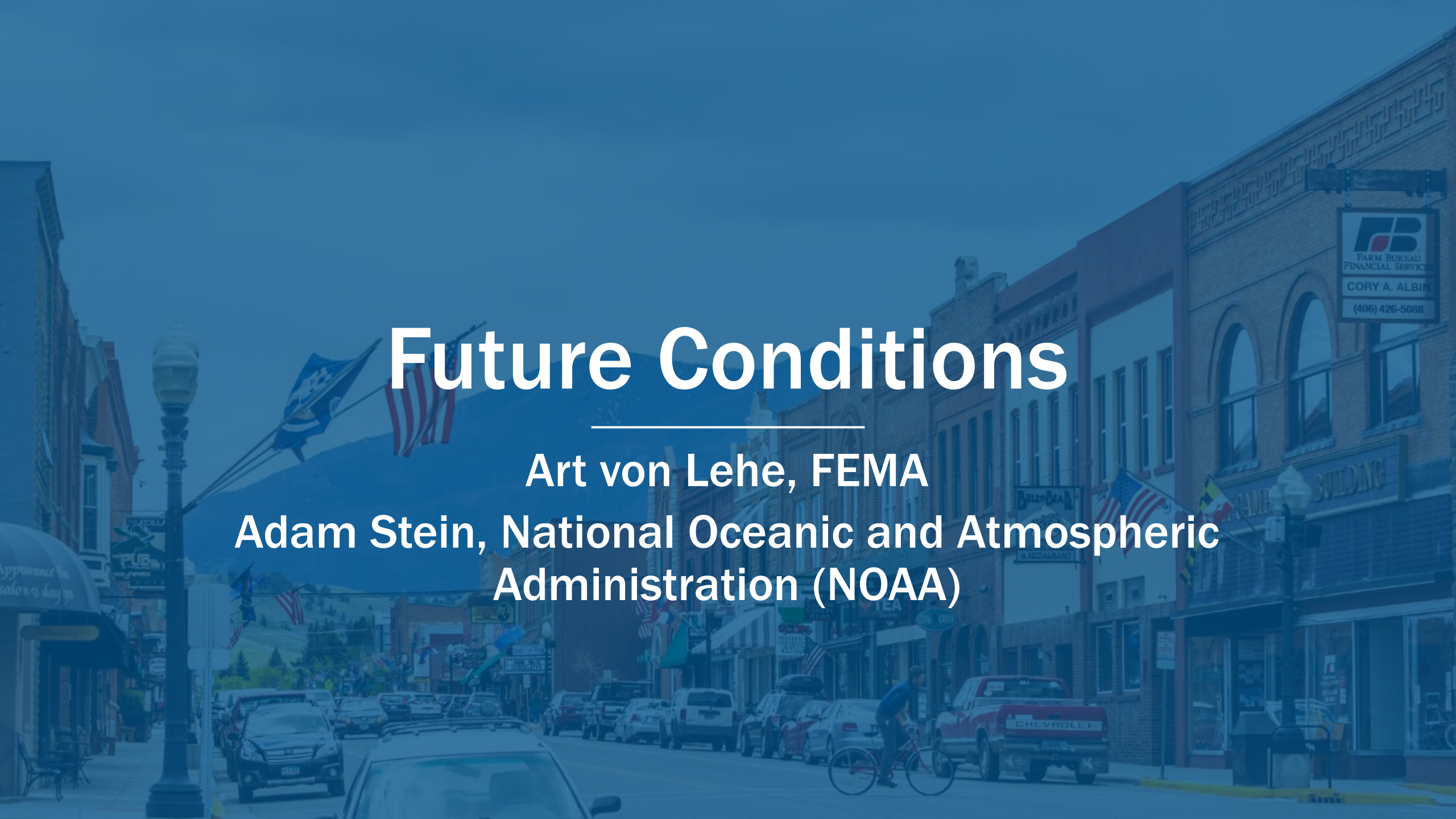
FEMA Nature-Based Solutions Guide



Building Community Resilience with Nature-Based Solutions: A Guide for Local Communities

https://www.fema.gov/media-library/assets/documents/188958





Future Conditions

Art von Lehe, FEMA

Adam Stein, National Oceanic and Atmospheric Administration (NOAA)

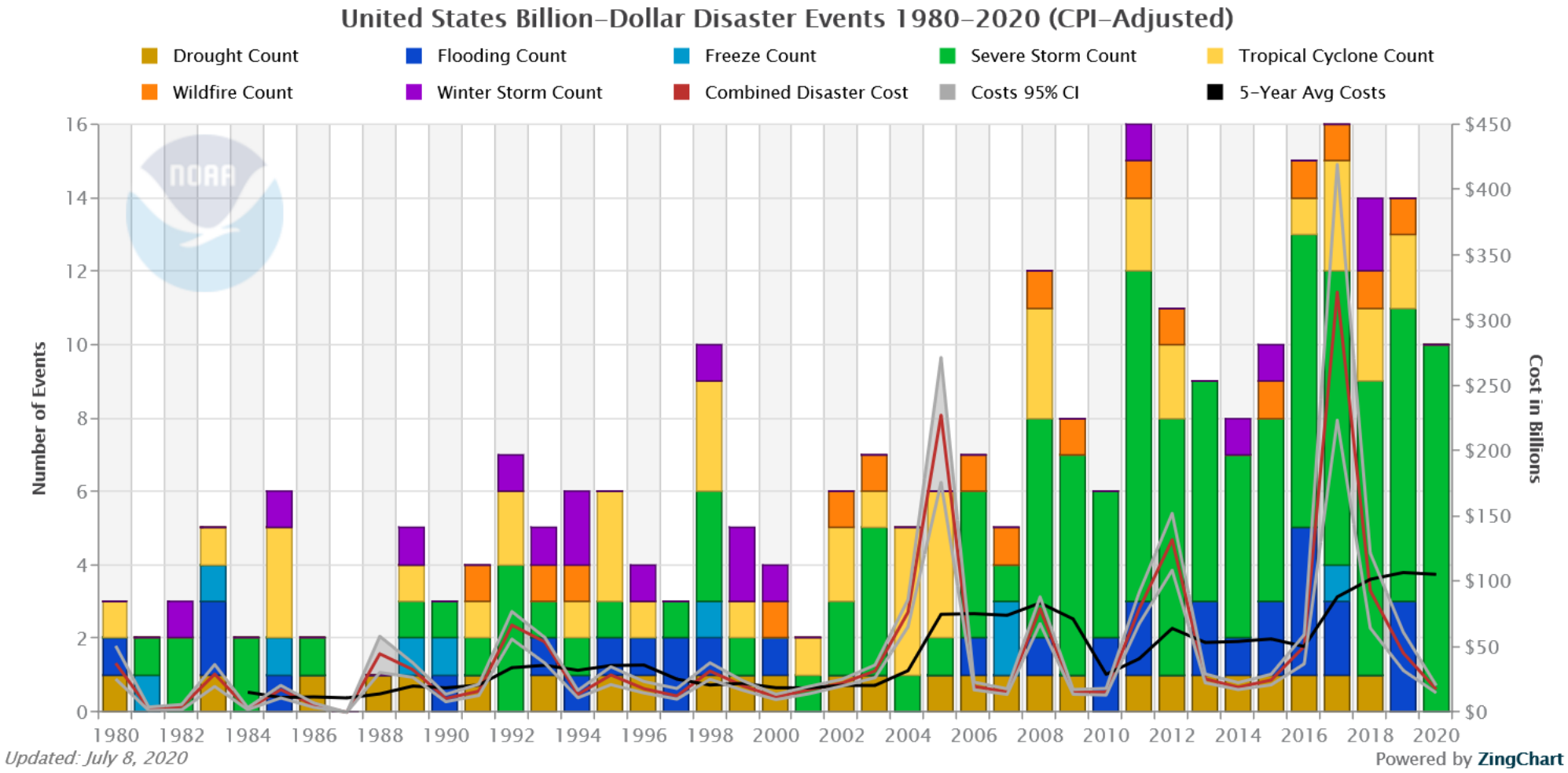
Future Conditions and Nature-based Solutions

Art von Lehe, FEMA

Office of Environmental Planning and Historic Preservation

IMAGE SOURCE: SC Sea Grant Consortium, https://www.scseagrant.org/sea-level-rise-and-climate-change

“The number and cost of disasters are increasing” - NOAA



SOURCE: NOAA, available at: https://www.ncdc.noaa.gov/billions/time-series/US

Changing Conditions and Emergency Management

Demographic and Development Trends

Land use

Urban and suburban growth

Deteriorating infrastructure

Aging population

Natural Hazard Trends

Extreme weather for flooding, heavy downpours, hurricanes, rising temperatures, wildfires, droughts, heat waves

Sea Level Rise

Emergency Management Implications

These trends are increasing the vulnerability of our communities and presenting new challenges for the field of Emergency Management

Nature-based Design, Future Conditions Information, and FEMA

The National Mitigation Investment Strategy	• The Strategy's scope includes: “Changing Conditions” and “Nature-Based Solutions and Natural Assets”
Natural Hazards Risk Assessment	• Future conditions information can be incorporated into your Hazus analysis
State Hazard Mitigation Plans	• FEMA-approved plan is required for hazard grant funding, including BRIC • Requires applicants take changing conditions into account
Benefit Cost Analysis	• For help applying sea level rise or other future conditions information to your project, please contact bchelpline@fema.dhs.gov or call 1- 855-540-6744
Community Rating System	• CRS grants additional credits for nature-based design projects and the use of sea level rise information

NOAA and Partner Resources: Future Conditions and Nature-Based Solutions

Photo: Jill Gambill, University of Georgia Marine Extension Service

Adam Stein

NOAA Office for Coastal Management

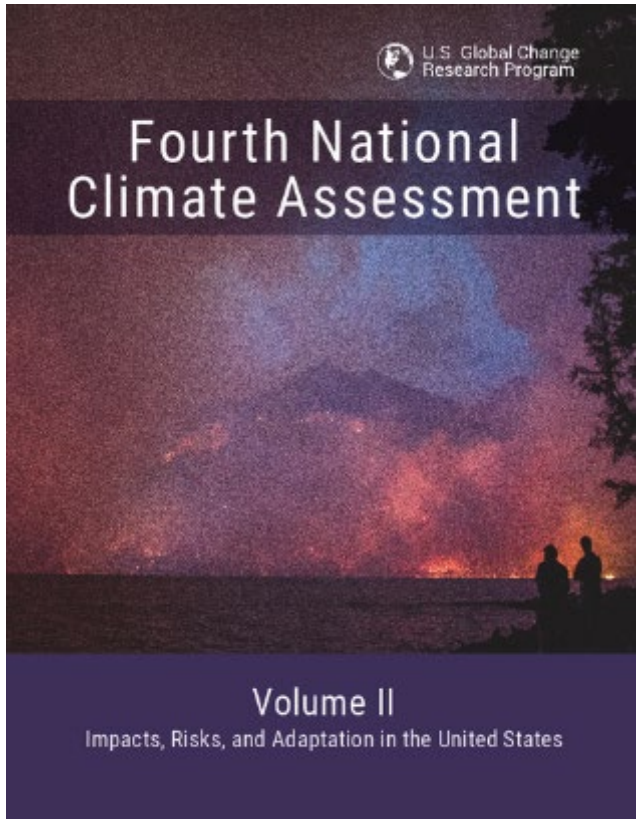
Resources

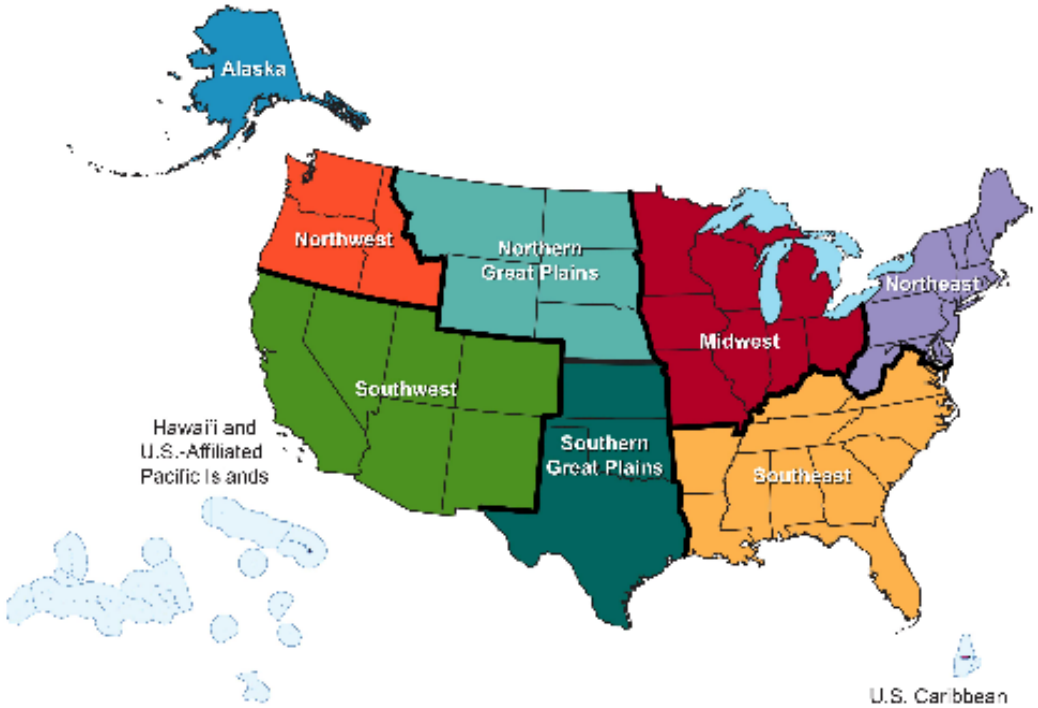
- Data and Information
- Partnerships
- Technical Assistance

Future Conditions

- Precipitation
- Temperature
- Drought
- Sea Level

U.S. Global Change Research Program



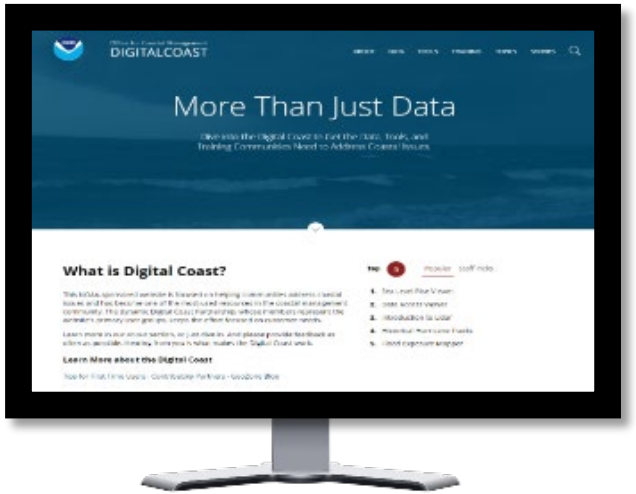


nca2018.globalchange.gov

NOAA Data and Information Resources

Digital Coast

https://coast.noaa.gov/digitalcoast/

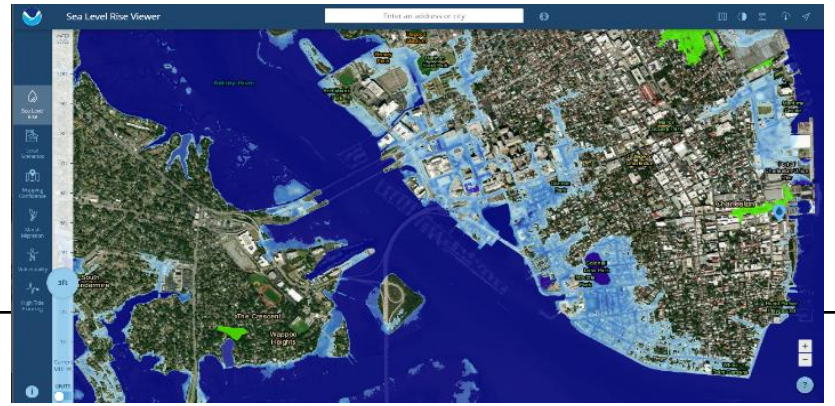


Coastal Flood Exposure Mapper

https://coast.noaa.gov/digitalcoast/tools/flood-exposure.html

Sea Level Rise Viewer

https://coast.noaa.gov/digitalcoast/tools/slr.html



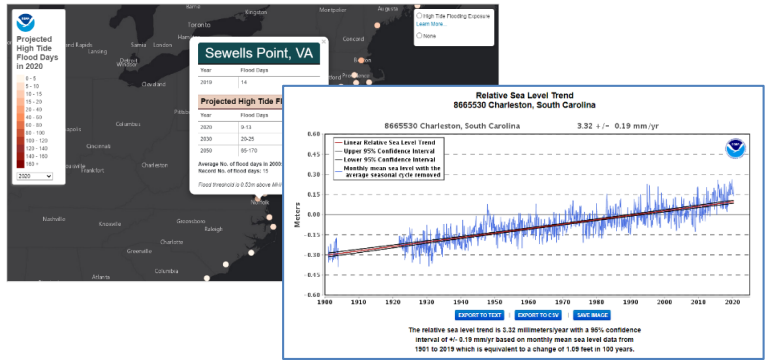
NOAA Data and Information Resources

Sea Level Trends

https://tidesandcurrents.noaa.gov/sltrends/sltrends.html

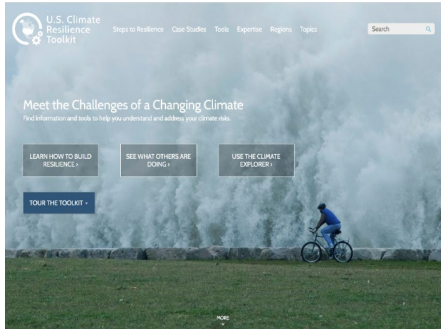
State of High Tide Flooding and Annual Outlook

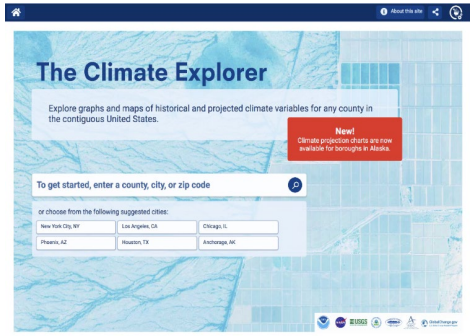
https://tidesandcurrents.noaa.gov/HighTideFlooding_AnnualOutlook.html



Climate Resilience Toolkit

https://toolkit.climate.gov/





The Climate Explorer

toolkit.climate.gov/tool/climate-explorer-0

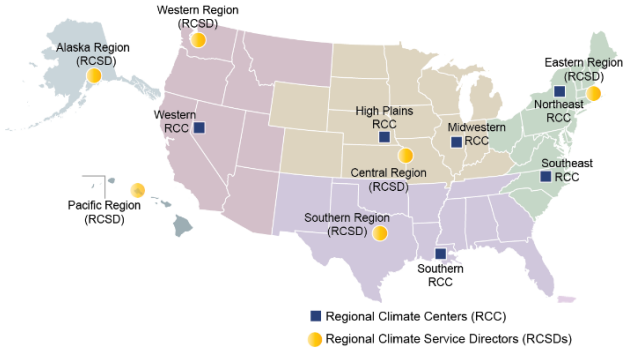
NOAA Partnerships and Technical Assistance

State Coastal Management Programs
https://coast.noaa.gov/czm/

NOAA Regional Integrated Science and Assessment Programs
https://cpo.noaa.gov/RISA

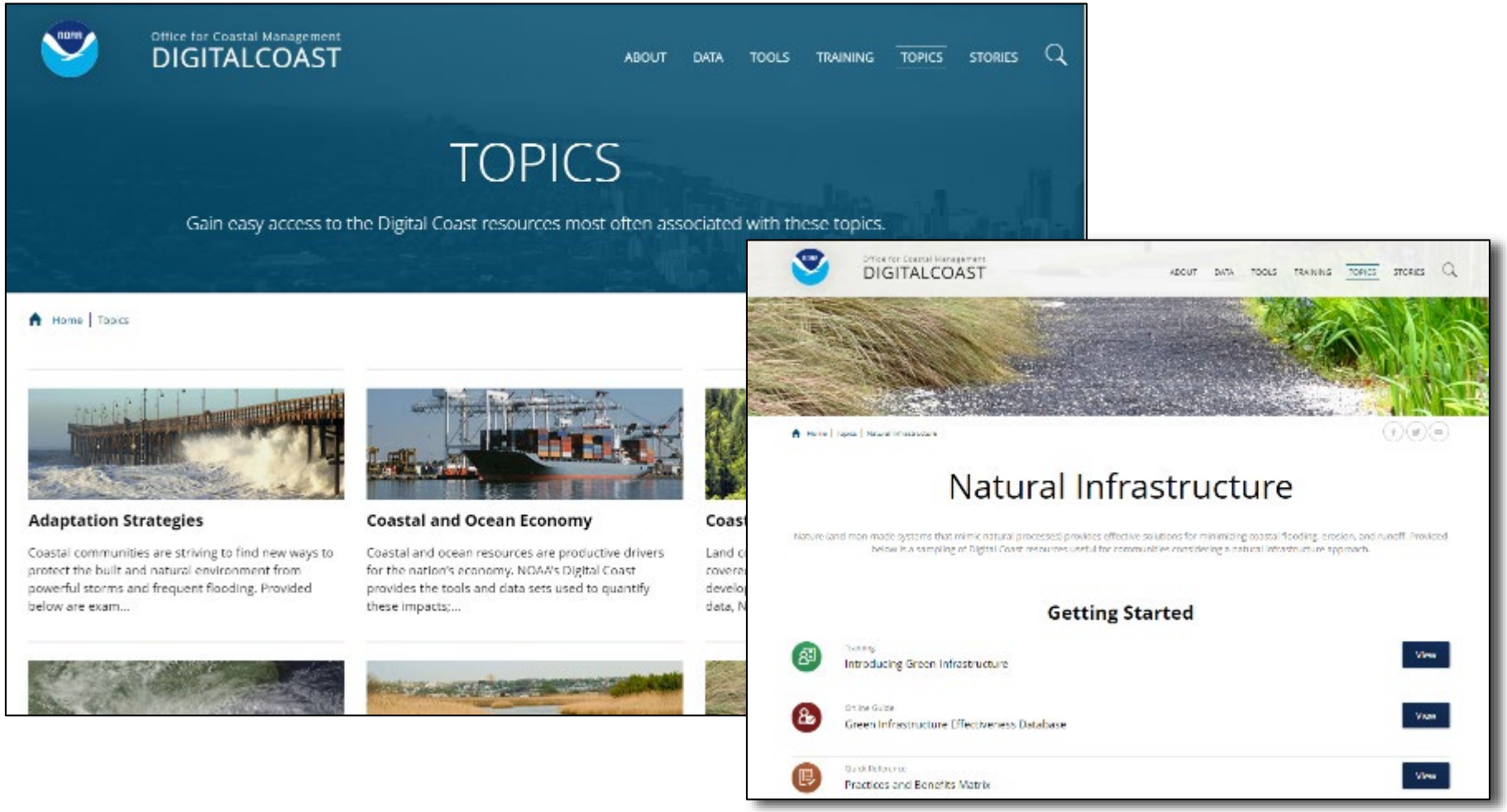
Sea Grant College Programs
https://seagrant.noaa.gov/

NOAA Regional Climate Services
https://www.ncei.noaa.gov/



American Association of State Climatologist
https://stateclimate.org/

Nature-Based Solutions Resources



https://coast.noaa.gov/digitalcoast/topics/green-infrastructure.html

Nature-Based Mitigation

Abby Hall, U.S. Environmental Protection Agency (EPA)
Sarah Murdock, The Nature Conservancy
Chad Berginnis, Association of State Floodplain Managers (ASFPM)

Memorandum of Agreement

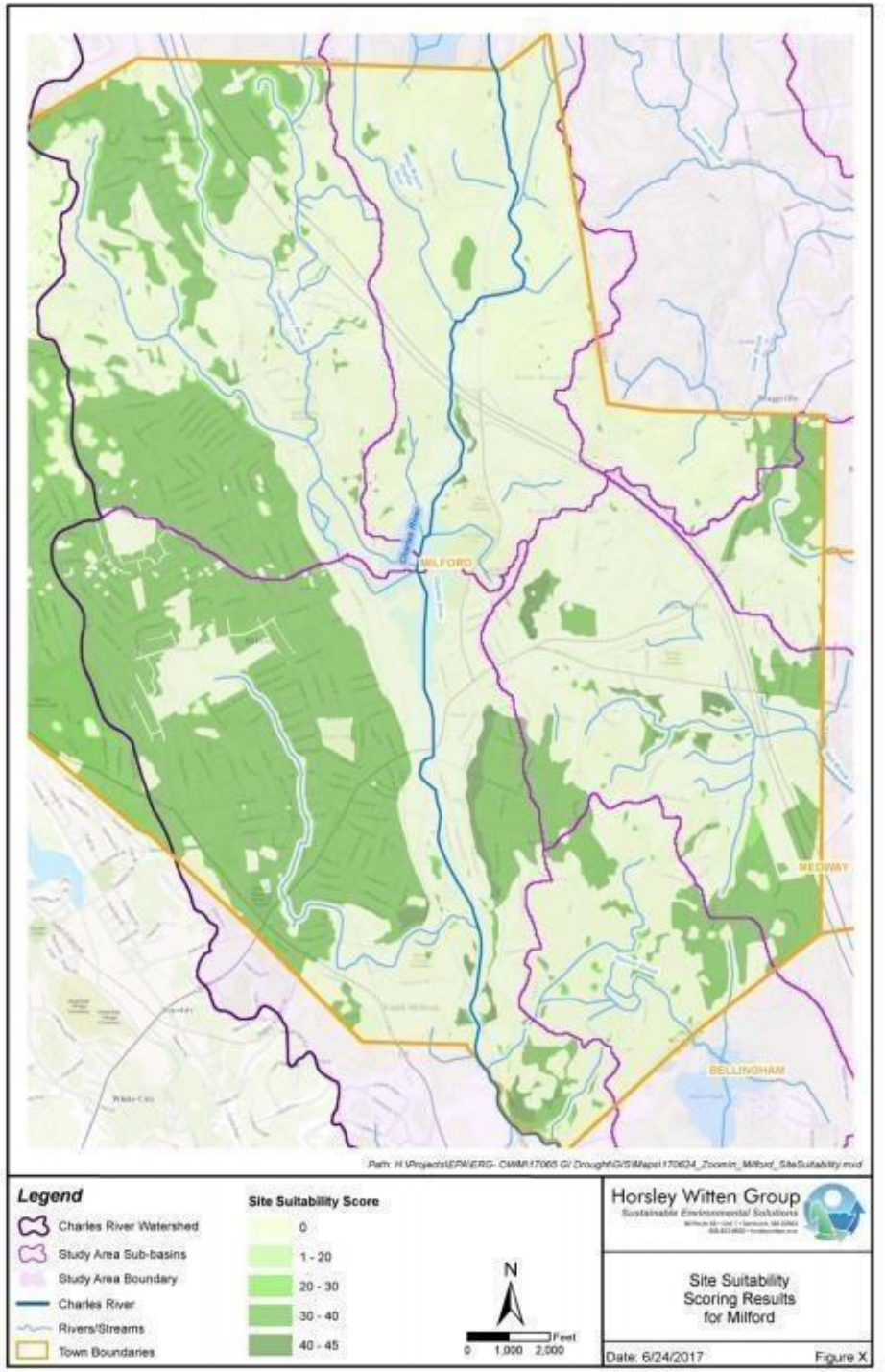
- Sets up coordination of activities between EPA's sustainable communities, smart growth, environmental, and community technical assistance programs and FEMA's disaster recovery planning and hazard mitigation programs.
- Seeks to provide lessons learned for EPA, FEMA, and other federal agencies that can be used to build a stronger federal framework for mitigation planning as well as pre- and post-disaster recovery planning and operations.
- Seeks to provide a collaborative framework for policy work related to both hazard mitigation planning and climate change adaptation to create more resilient communities.

Green Infrastructure at EPA

- 3 scales: Watershed, Neighborhood, Site
- Water quality + many other community benefits
- Climate resilience benefits
  - Manage flooding
  - Prepare for drought
  - Reduce urban heat island
  - Lower building energy demands
  - Spend less energy managing water
  - Protect coastal areas

Green Infrastructure & Hazard Mitigation

- EPA has funded projects integrating FEMA Hazard Mitigation Plans and water quality plans to reduce natural hazards, such as floods, landslides, and drought, while emphasizing water quality benefits, including in:
  - Ashland, OR
  - Albany, NY
  - State of Massachusetts
  - Huntington, WV
  - Mystic River Watershed, MA
  - Maricopa County, AZ



Map showing infiltration site suitability in Millford, MA.

Ashland, Oregon

- GIS mapping
- Ecosystem services evaluation
- Ordinance review
- Recommendations
  - Specific floodwater storage projects
  - Green streets program
  - Retrofit program for private landowners
  - Updated Jackson County HMP

GI and LID Example Best Management Practices	Natural Hazard Mitigation			Co-Benefits		
	Flood	Wildfire	Landslide	Water Quality	Community Benefits	Habitat
Minimize Impervious Area:						
Share parking spaces						
Minimize pavement widths						
Minimize front yard setbacks	●		●	●	●	◒
Share driveway						
Minimize building footprint(s)						
Minimize roadway cross section(s)						
Limit Disturbance of Undeveloped Land:						
Sequence construction schedule						
Conserve fast(er) draining soils						
Cluster development	◒		●	◒	●	◒
Preserve/protect trees						
Minimize foundation(s)						
Minimize grading						
Prevent Runoff from Landscape and Hardscape Areas:						
Rain garden(s)						
Bioswale(s)						
Bio-retention (infiltration) basin						
(Dry) Detention basin						
Tree and landscape planting(s)	●	◒	●	●	●	◒
Remove existing pavement						
Contained planters						
Vegetated roofs (green roofs)						
Porous Pavement						
Protect Land and Ecosystems:						
Conserve open space						
Protect/preserve wetlands						
Construct wetlands	●	●	◒	●	●	●
Protect/preserve riparian areas						
Maintain/enhance urban forest (forest parks)						

Source: *Low Impact Development in Western Oregon: A Practical Guide for Watershed Health*, with additions from the University of Oregon Service Center.

EPA United States Environmental Protection Agency

FEMA

RECOVERY AND RESILIENCY PARTNERSHIP

MEXICO BEACH

STORMWATER MANAGEMENT AND GREENSPACE PROJECT

MEXICO BEACH, FLORIDA

DECEMBER 2019

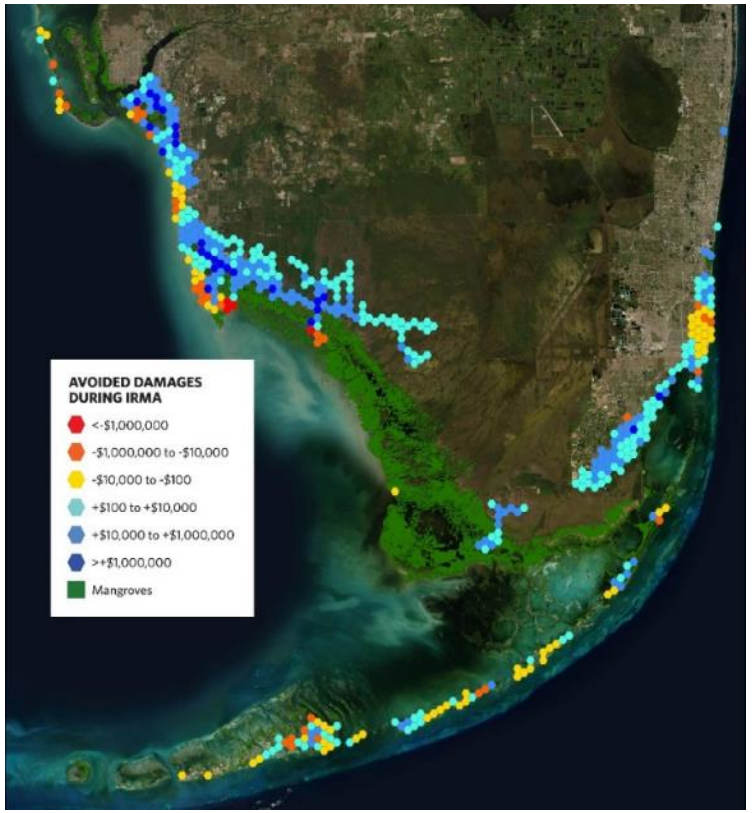
FEMA BRIC Summer Engagement Series
Session 5: BRIC and Nature – Based Solutions

The Nature Conservancy
Protecting nature. Preserving life.

Sarah Murdock, Dir. Climate Resilience Policy

Studying and Documenting Natural Infrastructure as an Effective and Cost-Effective Investment

Coastal Wetlands Prevented $625M in Property Damage During Hurricane Sandy



$1.5 Billion in avoided property damages due to mangroves in Hurricane Irma

Floodplain Projects Demonstrate Success: Puyallup River, WA

PUBLIC INFORMATION STATEMENT, NATIONAL WEATHER SERVICE SEATTLE WA
1035 AM PST MON FEB 2, 2015

...CHANGES IN THE NATIONAL WEATHER SERVICE FLOOD LEVELS FOR THE PUYALLUP RIVER BASIN...

THE NATIONAL WEATHER SERVICE (NWS) IN SEATTLE WILL BE MAKING ADJUSTMENTS TO THEIR FLOOD WARNING LEVEL FOR THE PUYALLUP RIVER NEAR ORTING FLOOD WARNING POINT. THIS IS **DUE TO FLOOD MITIGATION EFFORTS BY PIERCE COUNTY THAT HAS REDUCED THE FLOOD THREAT AT UNUSUALLY VULNERABLE LOCATIONS NEAR ORTING**.
HIGH RIVER FLOWS THIS YEAR HAVE CONFIRMED THE SUCCESS OF THESE EFFORTS. THEREFORE **THE THREAT OF FLOODING NO LONGER OCCURS AT THE LOW THRESHOLD OF 4500 CFS BUT AT THE MUCH HIGHER LEVEL OF 10000 CFS** AS IN PREVIOUS YEARS.

Lighting Point; Bayou La Batre, Alabama
Coastal Restoration – Multiple Benefit Project

Photo by: Moffat & Nichol

Near Complete (6/2020)

Lighting Point Project

FEMA BRIC Summer Engagement Series Session 5: BRIC and Nature – Based Solutions

Project Types and Resources

Chad Berginnis, CFM

Executive Director ASFPM

Rain Garden Reserve, Cuyahoga Falls, Ohio

Dare to Dream!

- Floodplain & stream restoration
- Floodwater diversion & storage
- Low Impact Development (LID)/ Green Infrastructure (GI)
- Flood friendly infrastructure
- Flood prone building acquisition
- Managed retreat

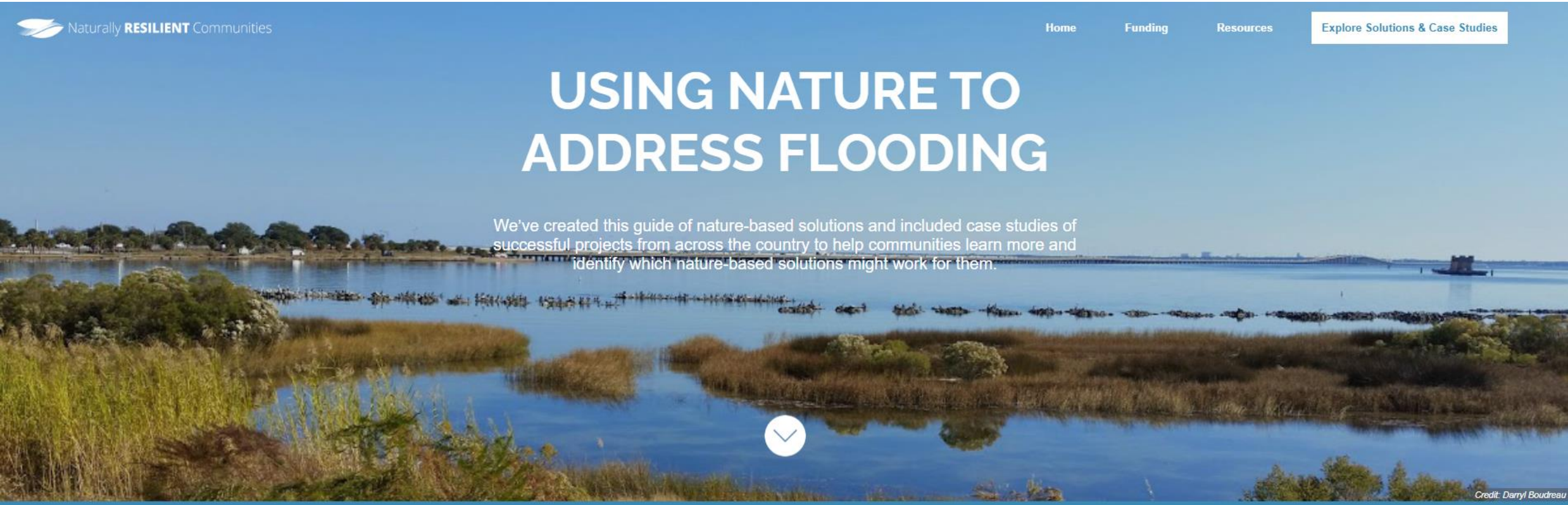
Grissom Elementary, Chicago, Illinois
Space to Grow Program (spacetogrowchicago.org)

Considerations

- Smarter buyout projects
- Multiple funding sources
- One project? Several projects?
- Plans and community goals?
- Timeframe

Rush Creek Linear Park,
Arlington, Texas

Resources



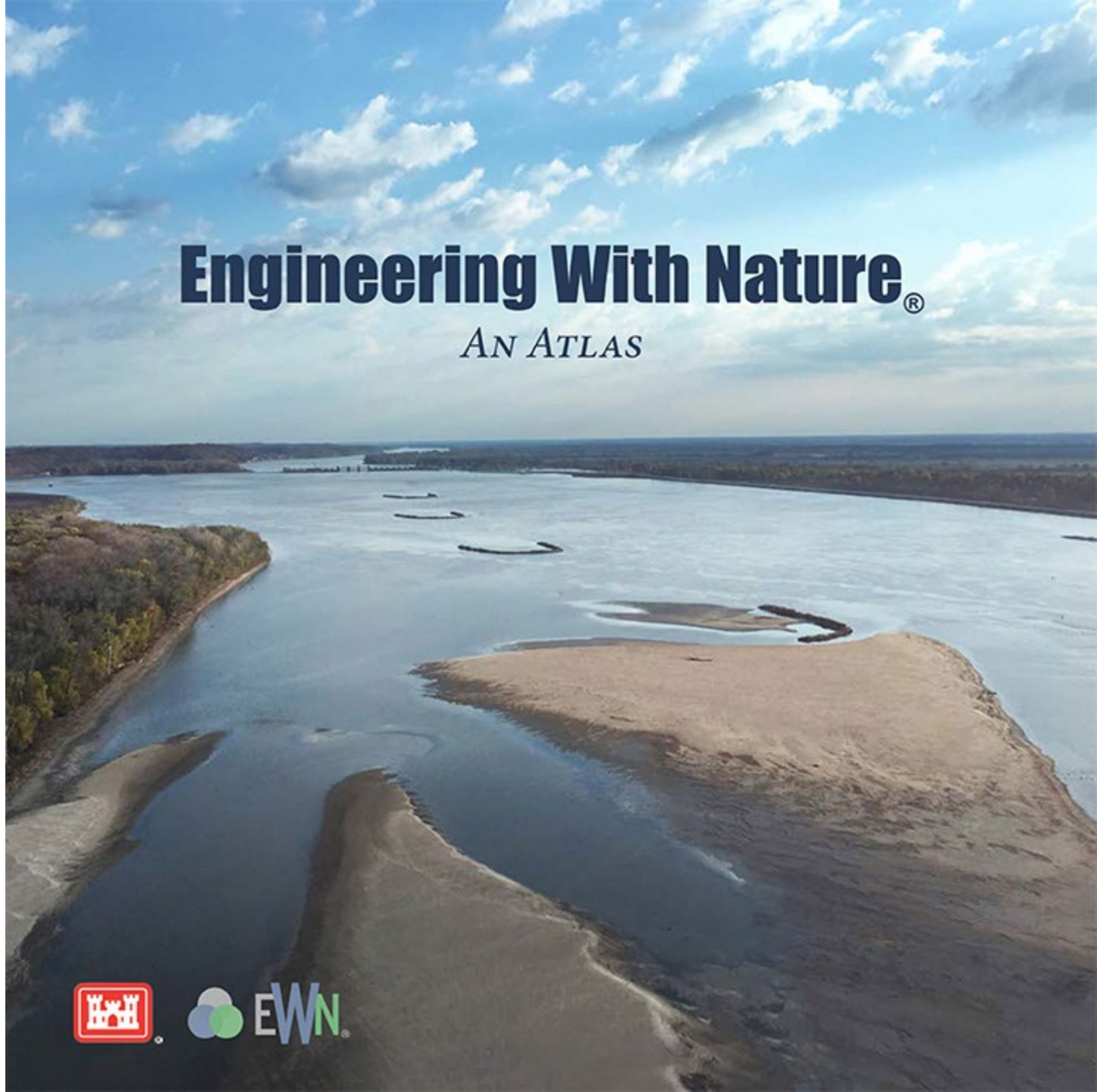
WHAT ARE NATURE-BASED SOLUTIONS?

Nature offers a powerful set of tools for addressing hazards like flooding and erosion. Nature-based solutions use natural systems, mimic natural processes, or work in tandem with traditional approaches to address these specific hazards. Communities across the country— along rivers or coasts, large or small, rural or urban— can incorporate nature-based solutions in local planning, zoning, regulations, and built projects to help reduce their exposure to flood and erosion impacts.

nrcsolutions.org

Resources

- Innovative Drought and Flood Mitigation Projects, FEMA (2017)
- Engineering with Nature *An Atlas*, USACE (2019)
- EPA's green infrastructure website epa.gov/green-infrastructure
- Green Infrastructure Toolkit, Georgetown Climate Center
- Floodplain Buyouts: An Action Guide for Local Governments on How to Maximize Community Benefits, Habitat Connectivity, and Resilience, UNC and ELI (2017)



Discussion

BRIC Stakeholder Engagement Sessions

- BRIC Engagement Sessions – all about the BRIC program (July 2020)

  Recordings available at: https://www.youtube.com/playlist?list=PL720Kw_OojIKKwDJQpkCLJ-6v4I_ndNEJ

  - July 1: Introduction to BRIC
  - July 8: Meaning of the BRIC Name
  - July 15: BRIC and Building Codes
  - July 22: BRIC and Community Lifelines
  - July 29: BRIC and Nature-based Solutions
- BRIC NOFO Webinars – will occur after NOFO is released (August - September 2020)

Resources

Building Resilient Infrastructure and Communities

https://www.fema.gov/bric

Sign up for BRIC and HMA Updates: https://www.fema.gov/hazard-mitigation-assistance

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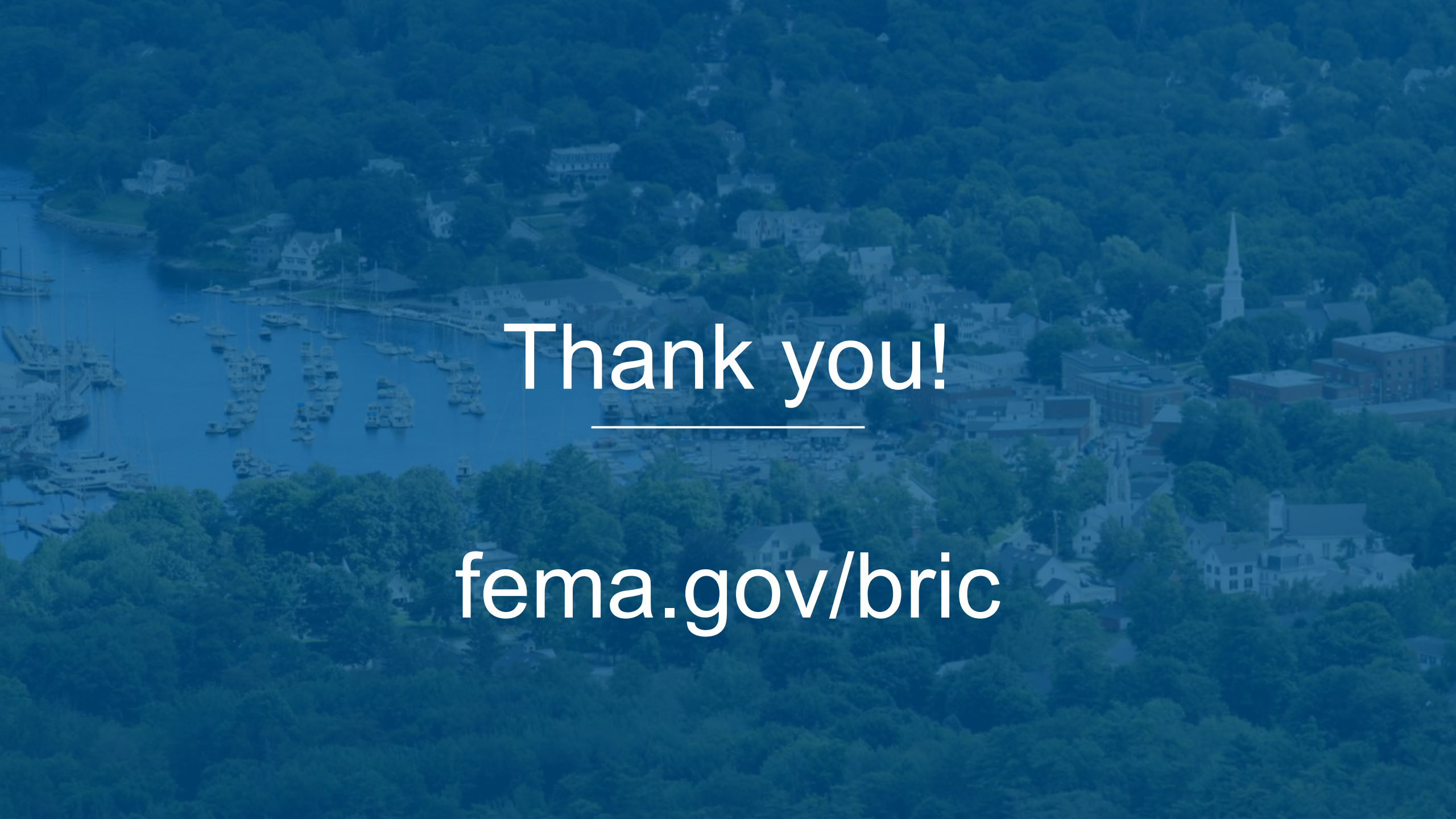
Thank you!
fema.gov/bric