Nature-Based Solutions, Climate Change & Future Conditions

BRIC and FMA Program Webinar Series | **July 28, 2021**

FEMA

Photo of Miami, Florida

Agenda

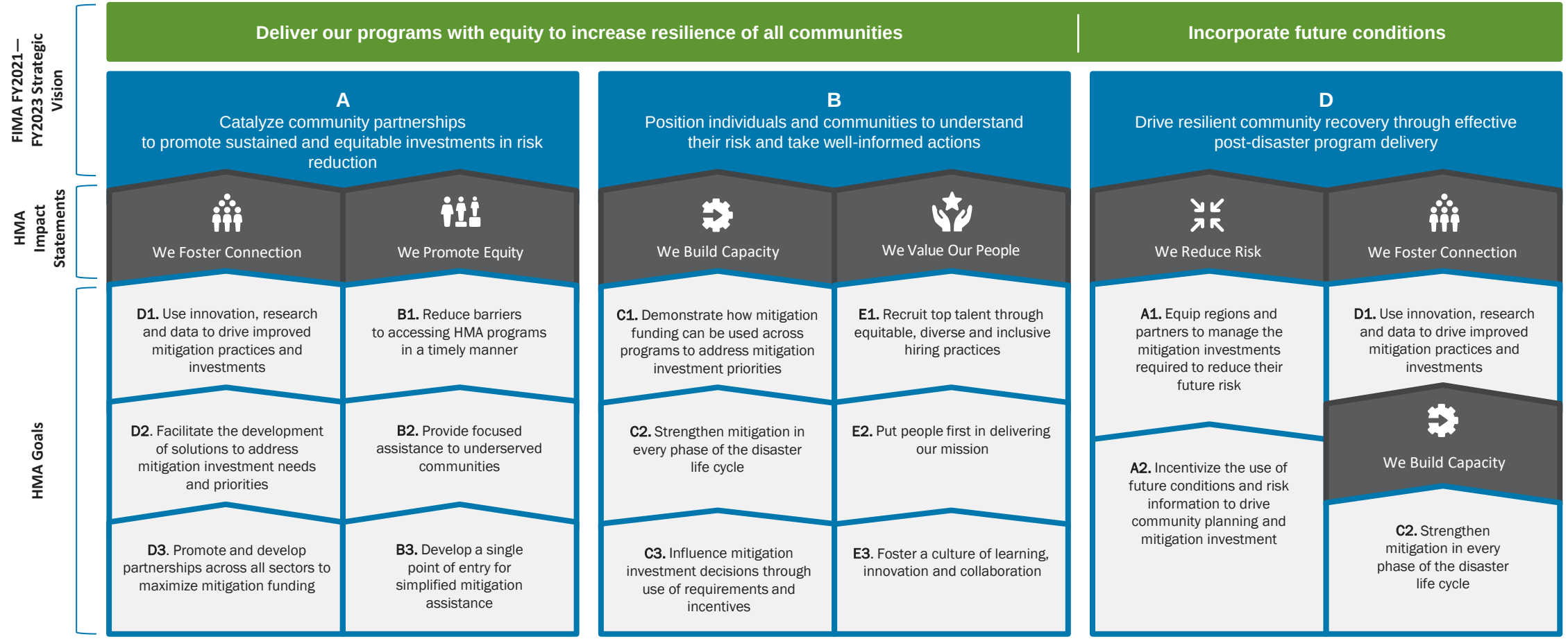
- **Welcome and Introduction**
  Kayed Lakhia, AIA, NCARB, LEED AP, CFM, FEMA
- **BRIC's Overview on Nature-Based Solutions**
  Camille Crain, FEMA
- **Climate Change with Future Conditions**
  Josh Murphy, National Oceanic and Atmospheric Administration (NOAA)
- **Nature-Based Mitigation**
  Sarah Murdock, The Nature Conservancy
- **Discussion**

Hazard Mitigation Assistance Strategic Framework

Five of our key main aspects of the framework are (1) to reduce risk, (2) promote equity, (3) build capacity, (4) foster connections and (5) value our people.

HMA Vision, Mission, Values	**HMA Vision:** A prepared and resilient nation **HMA Mission:** Help people reduce disaster risk through partnerships and mitigation investments to increase resilience			**HMA Values:** HMA embodies the FEMA Core Values of Compassion, Fairness, Integrity, and Respect and additionally seeks to promote Empathy, Efficiency, Professionalism, Creativity, Collaboration and Fun in achieving our mission.	
HMA Impact Statements	 **A: WE REDUCE RISK:** FEMA and our partners can anticipate and manage risks from cascading, frequent and changing conditions	 **B: WE PROMOTE EQUITY:** Partners have straightforward and equitable access to HMA programs	 **C: WE BUILD CAPACITY:** Communities reduce the risk of loss of life and property by using all available programs, tools and resources	 **D: WE FOSTER CONNECTION:** HMA brings people and communities together to help them consider risk and mitigation in all investment decisions	 **E: WE VALUE OUR PEOPLE:** HMA is an employer of choice in the field of Mitigation and attracts, nurtures and retains top talent to deliver our mission
HMA Goals	**A1.** Equip regions and partners to manage the mitigation investments required to reduce their future risk **A2.** Incentivize the use of future conditions and risk information to drive community planning and mitigation investment	**B1.** Reduce barriers to accessing HMA programs in a timely manner **B2.** Provide focused assistance to underserved communities **B3.** Develop a single point of entry for simplified mitigation assistance	**C1.** Demonstrate how mitigation funding can be used across programs to address mitigation investment priorities **C2.** Strengthen mitigation in every phase of the disaster life cycle **C3.** Influence mitigation investment decisions through use of requirements and incentives	**D1.** Use innovation, research and data to drive improved mitigation practices and investments **D2**. Facilitate the development of solutions to address mitigation investment needs and priorities **D3**. Promote and develop partnerships across all sectors to maximize mitigation funding	**E1.** Recruit top talent through equitable, diverse and inclusive hiring practices **E2.** Put people first in delivering our mission **E3**. Foster a culture of learning, innovation and collaboration

HMA Strategic Framework Alignment with FEMA's Strategic Vision



BRIC Overview on Climate Change, Future Conditions and Nature-Based Solutions

Camille Crain

Climate Change

FEMA

Future Conditions

Climate changes

Demographic changes

Population changes

Land use changes

FEMA

BRIC FY 2020 Qualitative Criteria

Nature-Based Solutions

- Support natural hazard risk mitigation
- Provide economic, environmental, and social resilience benefits
- Practices that intertwine natural features or processes into the built environment to build more resilient communities

Examples:

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

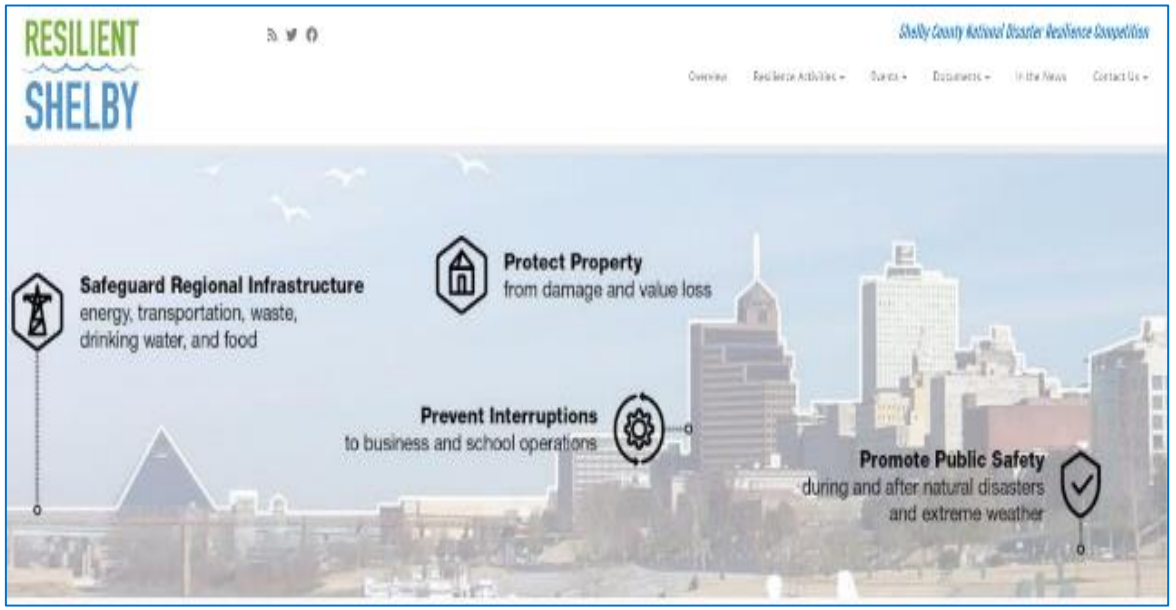
BRIC FY 2020 Technical Criteria

The Art of the Possible

Example Projects

Floodwater Storage and Wetland Restoration Project

Shelby County, TN
FEMA Region IV



Resilient Shelby: Greenprint for Resilience
Shelby County, Tennessee

Resilient Shelby's Greenprint for Resilience – Shelby County, Tennessee

- 3 nature-based scalable resilience projects
- Future Conditions
- Equity/Co-benefits

From Mitigation Action Portfolio (MAP):
https://www.fema.gov/sites/default/files/documents/fema_mitigation-action-portfolio-support-document.pdf

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Shoreline and Marsh Restoration Project

Galveston County, TX
FEMA Region VI

Virginia Point Wetland Restoration Project, aerial view
Galveston County, Texas

Virginia Point Wetland Project – Galveston County, Texas

- Shoreline and marsh restoration project to address erosion
- Restored 10,000 feet of shoreline and 25 acres of marsh in Galveston Bay
- Design elements will also provide resilience to the impacts of sea level rise, wave energy, and storm surges

From Mitigation Action Portfolio (MAP):
https://www.fema.gov/sites/default/files/documents/fema_mitigation-action-portfolio-support-document.pdf

Utility Relocation and Stormwater Management Project

Hurricane Matthew flooding impacts in Princeville, North Carolina

Town of Princeville, North Carolina

- Relocation of the utilities (electrical, water, wastewater) outside the Special Flood Hazard Area
- 25% of population and associated utilities will be relocated to 53-acre parcel
- Phased project through BRIC for relocation of utilities
- Coordinated funding with FEMA HMGP and Public Assistance, along with HUD CDBG-DR funds, for acquisition/relocation of residences, public infrastructure, and improved stormwater management

Shoreline Protection Project

Tottenville Shoreline Protection Project, Staten Island, New York

Tottenville Shoreline Protection Project – Staten Island, New York

- Waterfront communities have experienced flooding and extensive damage from storms
- Shoreline protection project utilizes various nature-based solutions, including an earthen berm, hybrid dune, and eco-revetments
- Aims to reduce the risk of damage and improve social resiliency while considering the future conditions of 30 inches of sea level rise

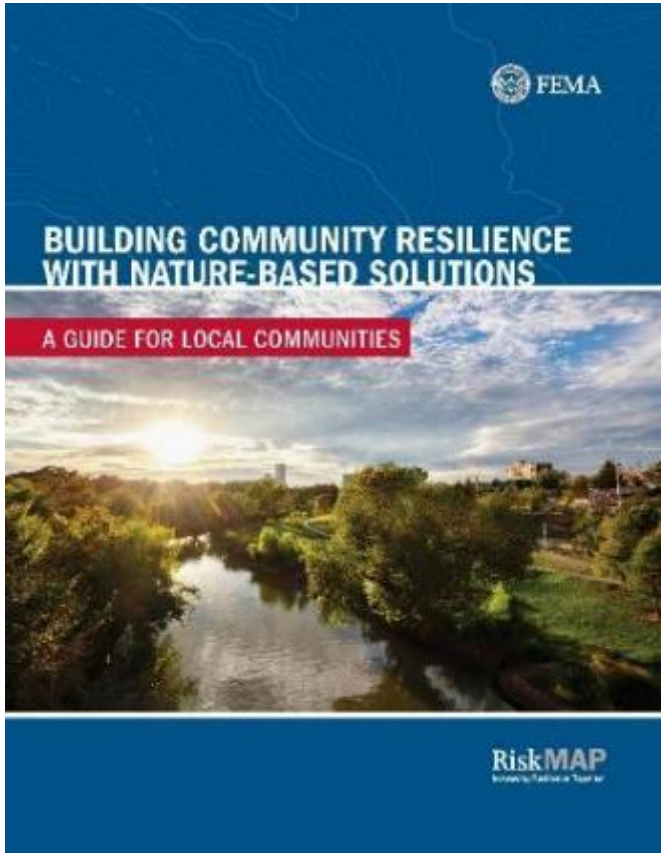
Wildfire Mitigation Project

Wildfire Resilient Sonoma County, California

Nature-based Mitigation to Adapt in an Era of Megafires

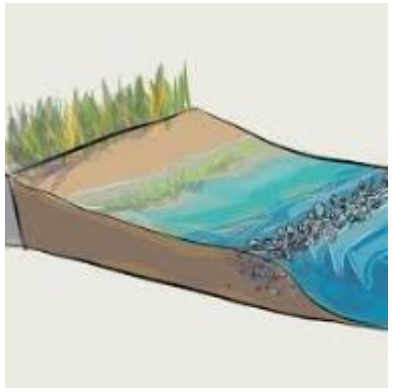
- Inside-Out, Outside-In (IO-OI) – neighborhood + wildland scale
- Neighborhood scale: structural hardening and defensible space strategies
- Wildland scale: reduces fuel and provides buffers

FEMA Nature-Based Solutions Guide



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

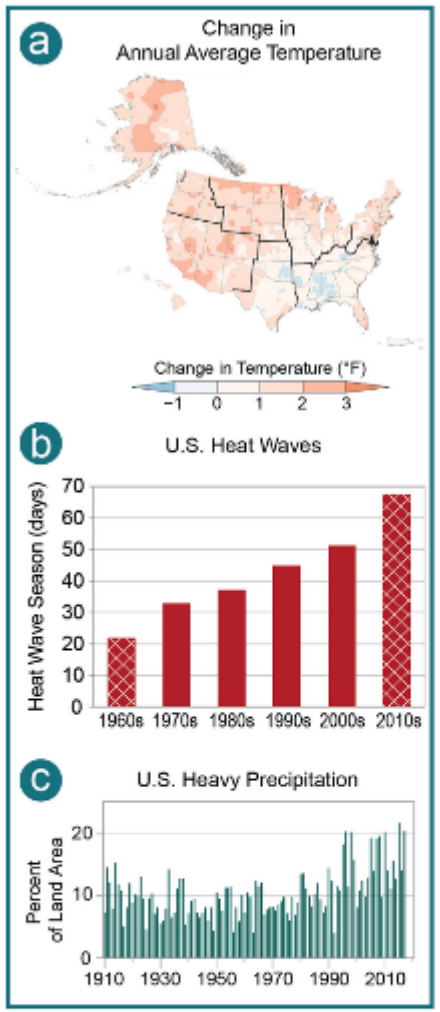
www.fema.gov/nature-based-solutions-guide

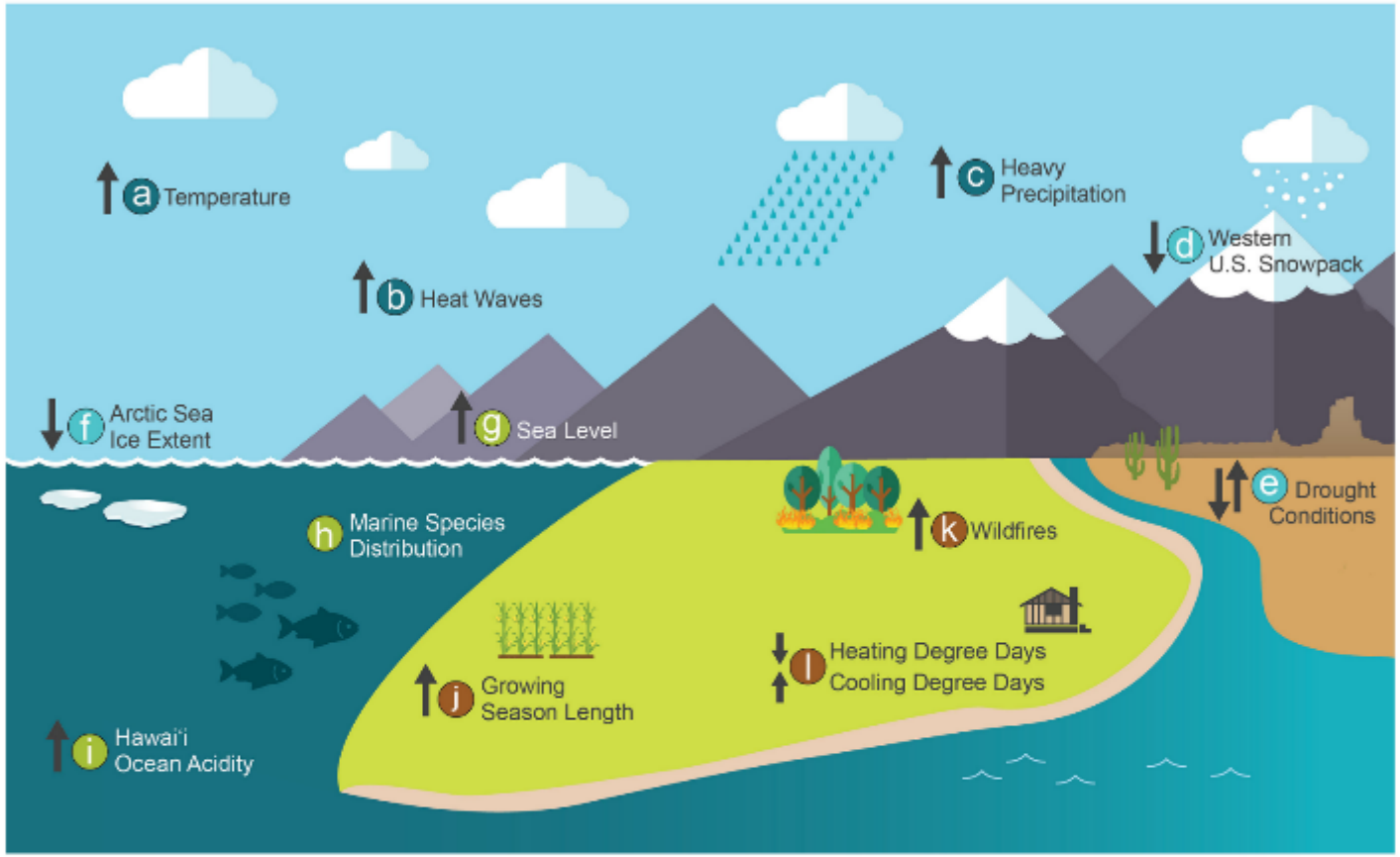


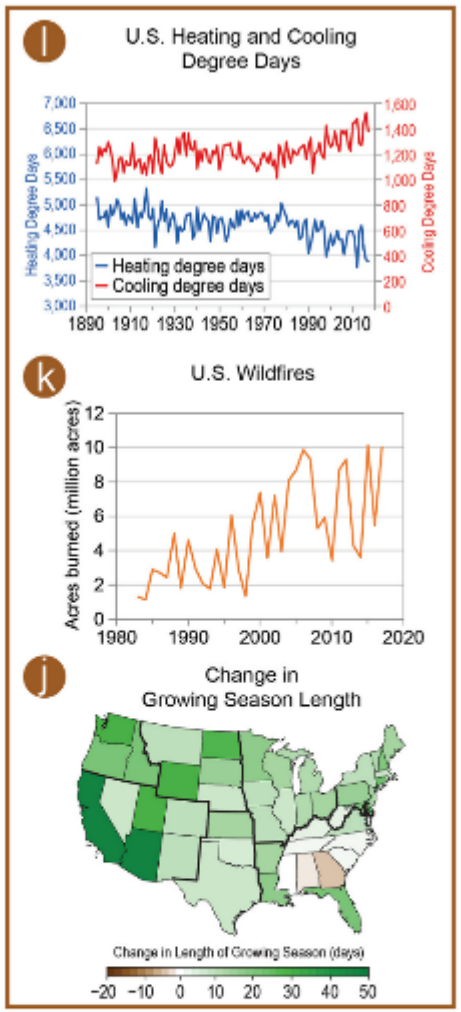
Climate Change and Future Conditions

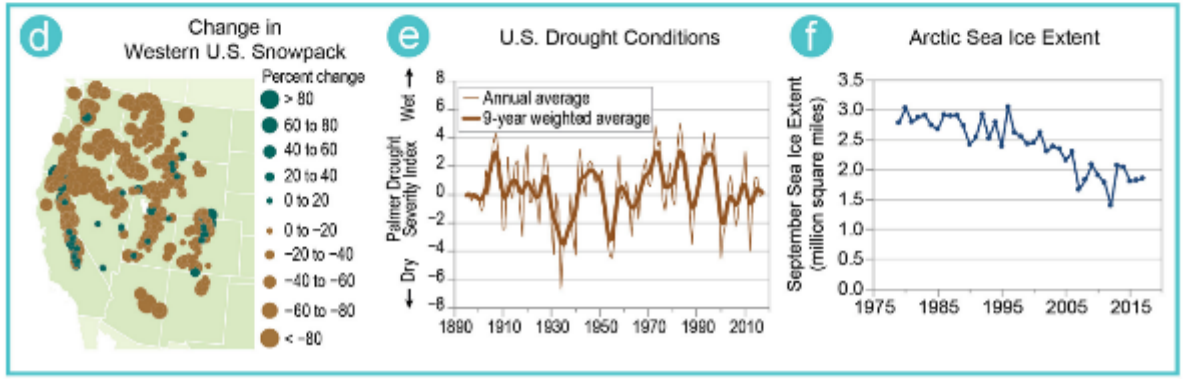
Josh Murphy, National Oceanic and Atmospheric Administration (NOAA)

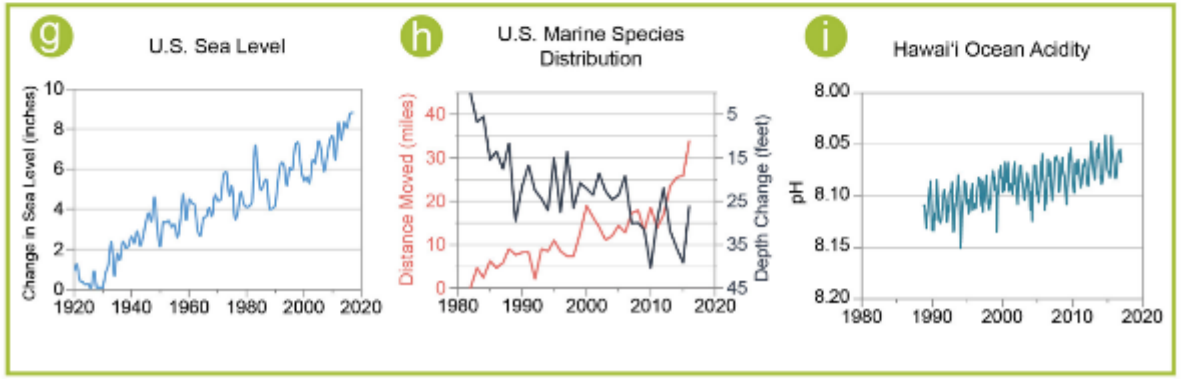
Source: 4th National Climate Assessment





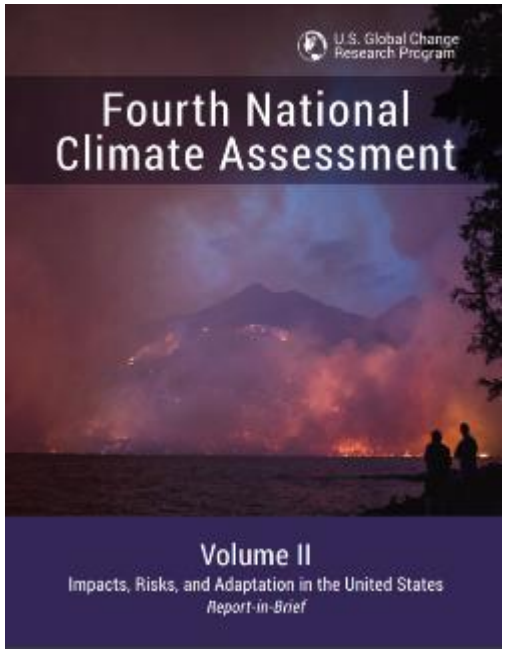






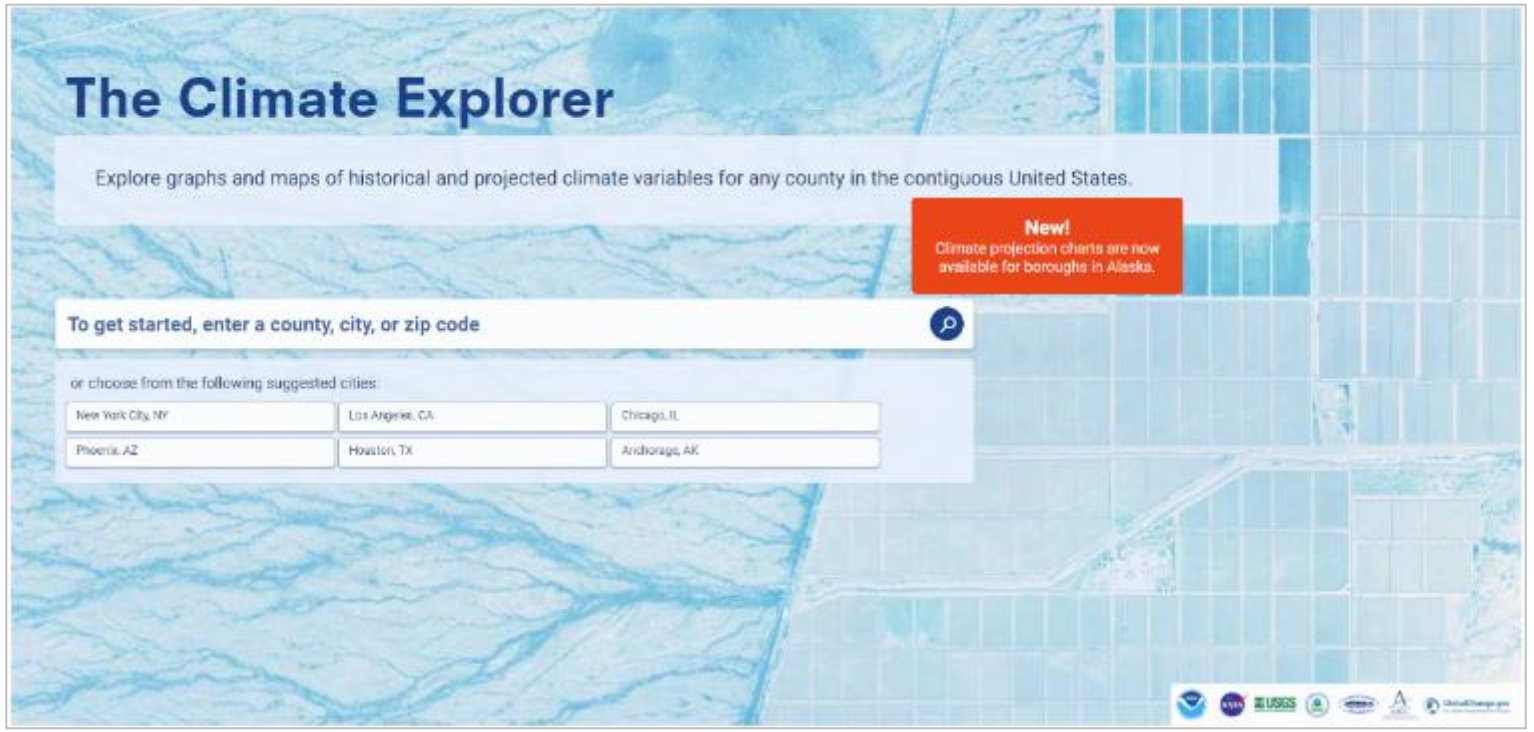
4th National Climate Assessment

https://nca2018.globalchange.gov/



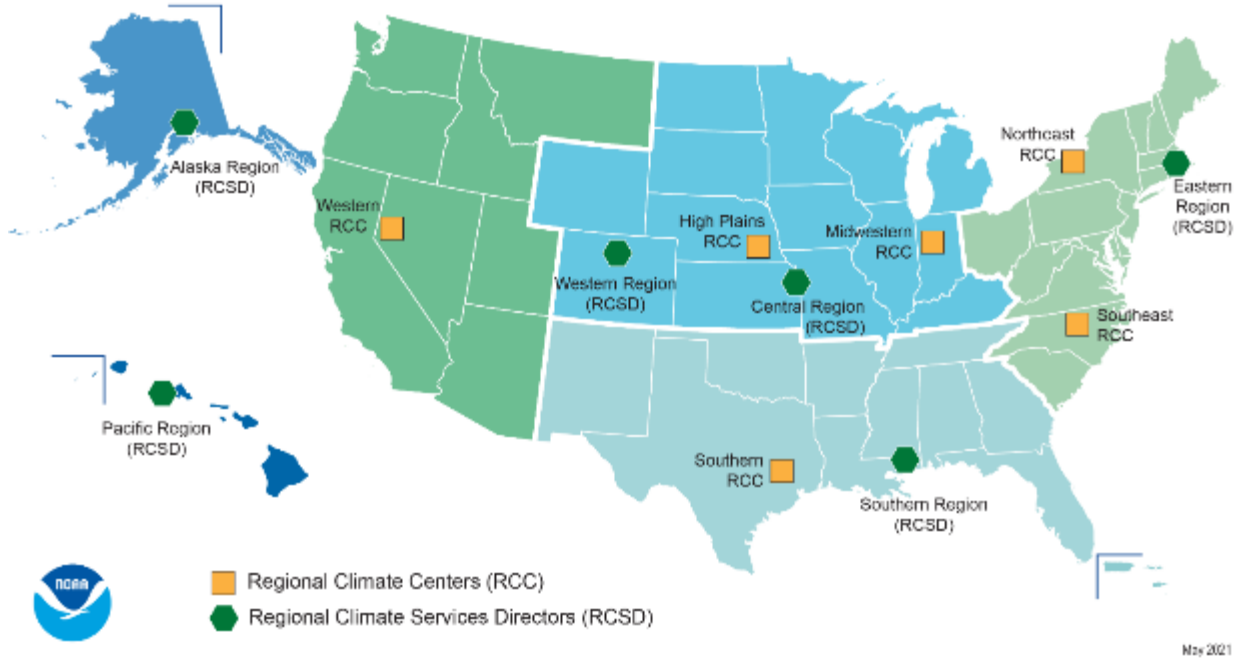
Climate Explorer

https://crt-climate-explorer.nemac.org/

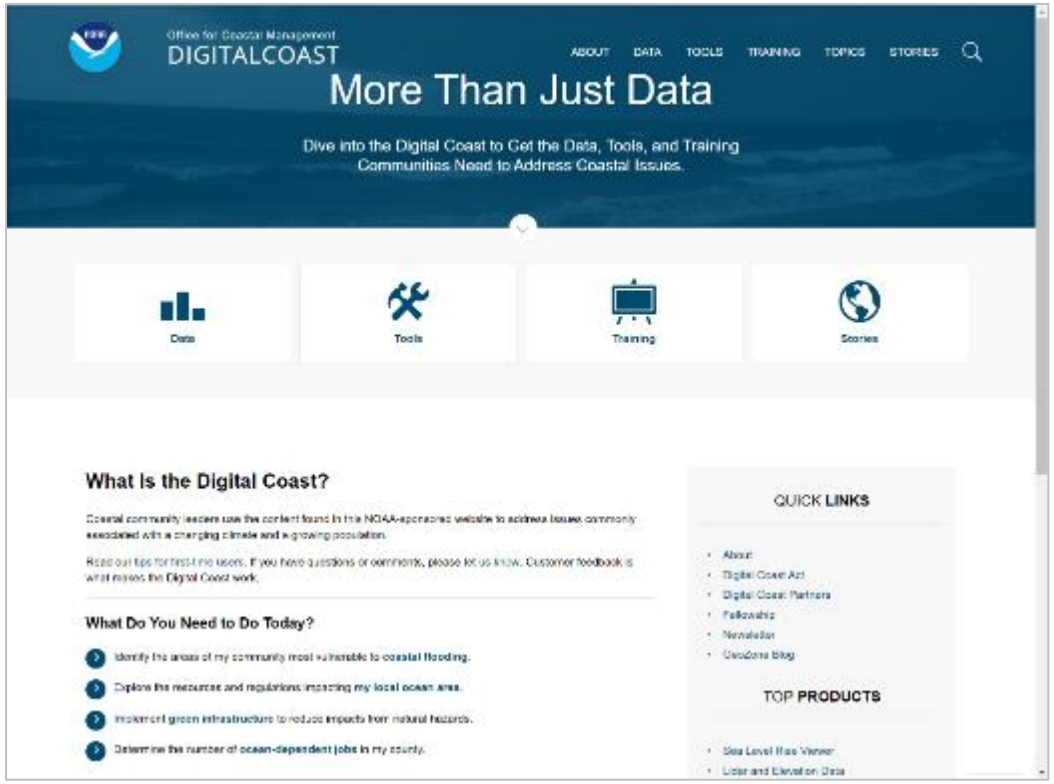


Regional Climate Resources

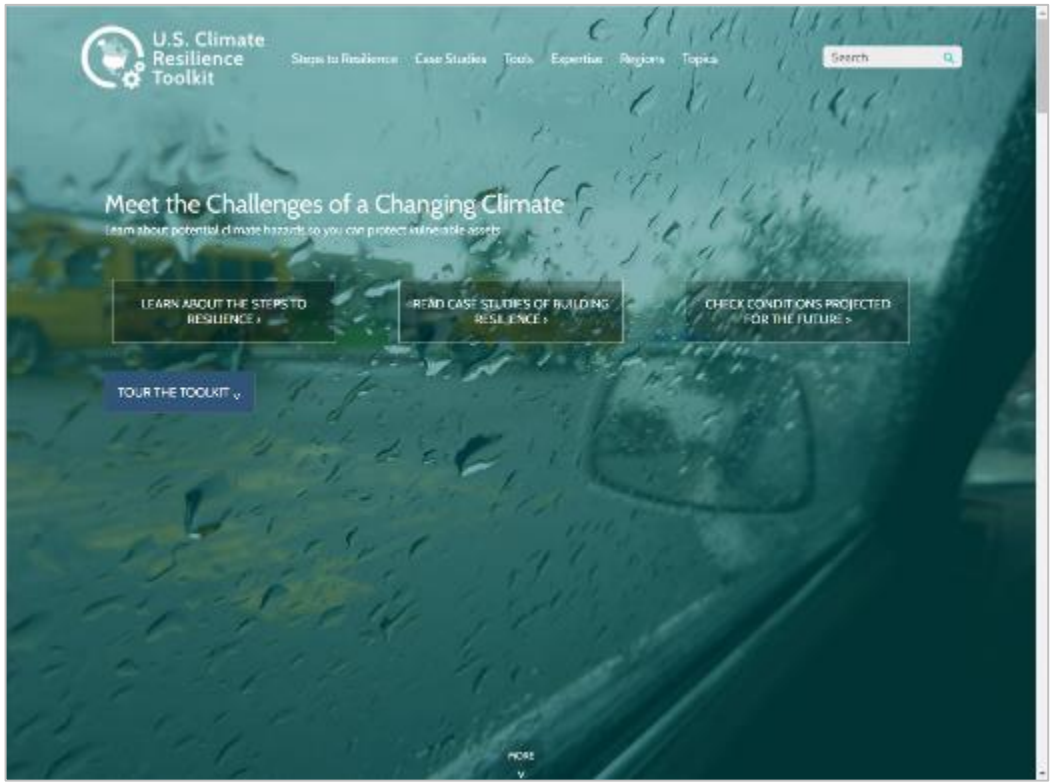
- State Coastal Management Programs
- NOAA Regional Integrated Science and Assessment Programs (RISA)
- NOAA Regional Climate Services
- Sea Grant College Programs



Capacity Building Platforms



Digital Coast



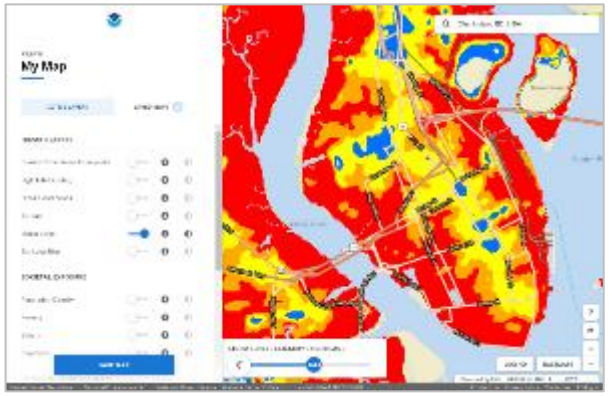
Climate Resilience Toolkit

Integrated, Equitable Information

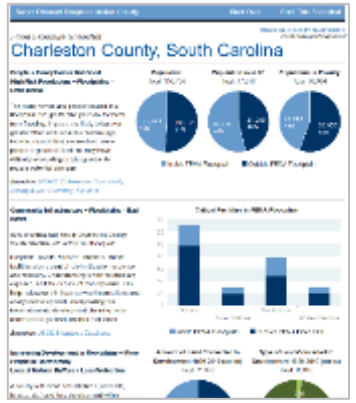
Tools and Resources for Understanding Coastal Flood Risk

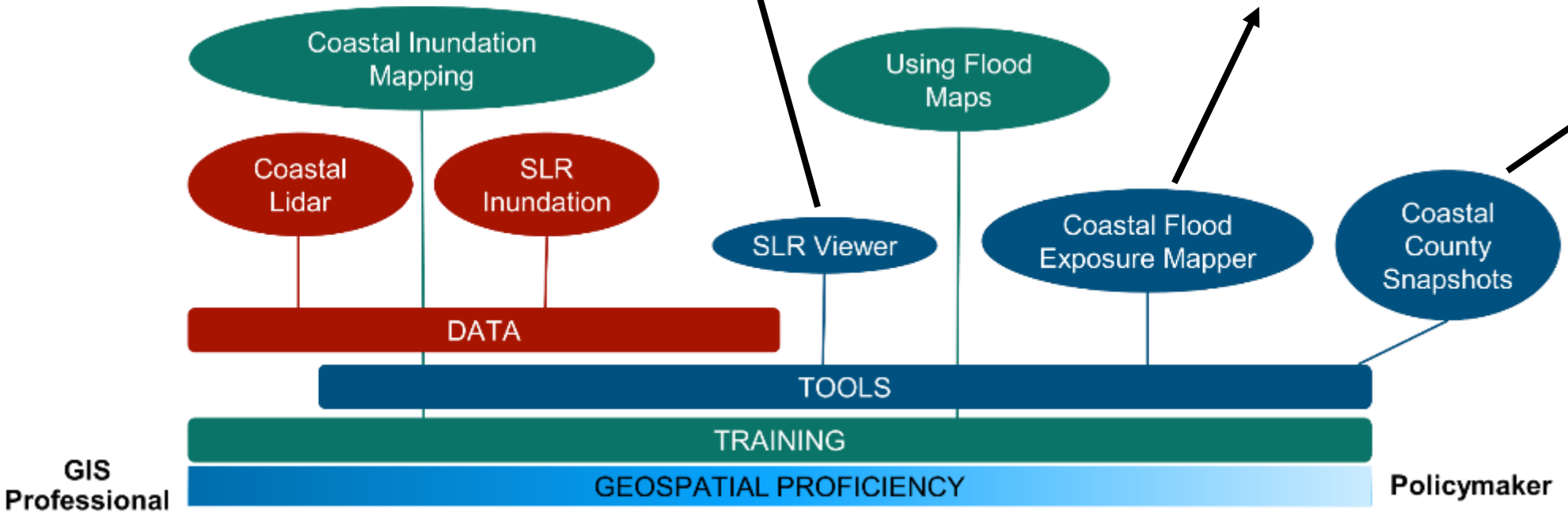
Sea Level Rise Viewer

Coastal Flood Exposure Mapper



Coastal County Snapshots

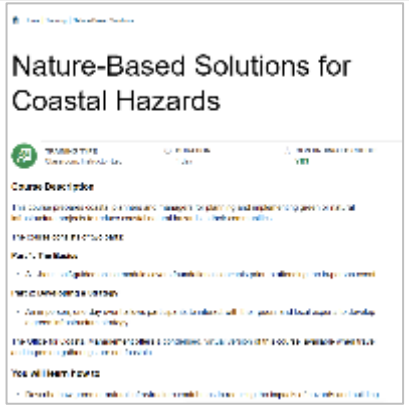




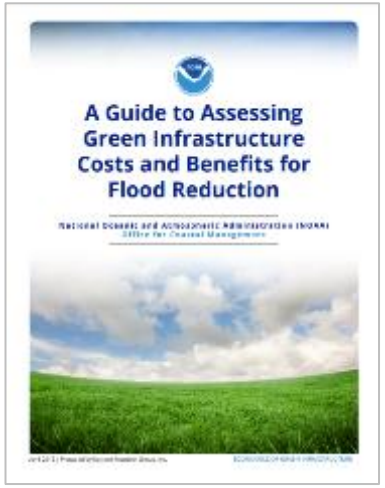
Looking to Nature to Build Resilience

How-to Map Open Space for CRS Credit

Nature-Based Solutions for Coastal Hazards



Assessing GI Costs and Benefits for Flood Reduction



How to Map Open Space for CRS Credit

Nature-based Solutions for Coastal Hazards

Assessing Costs and Benefits for Flood Reduction

C-CAP Data

Coastal Resilience 2.0

Land Cover Atlas

DATA

TOOLS

TRAINING

GEOSPATIAL PROFICIENCY

GIS Professional

Policymaker

For More Information

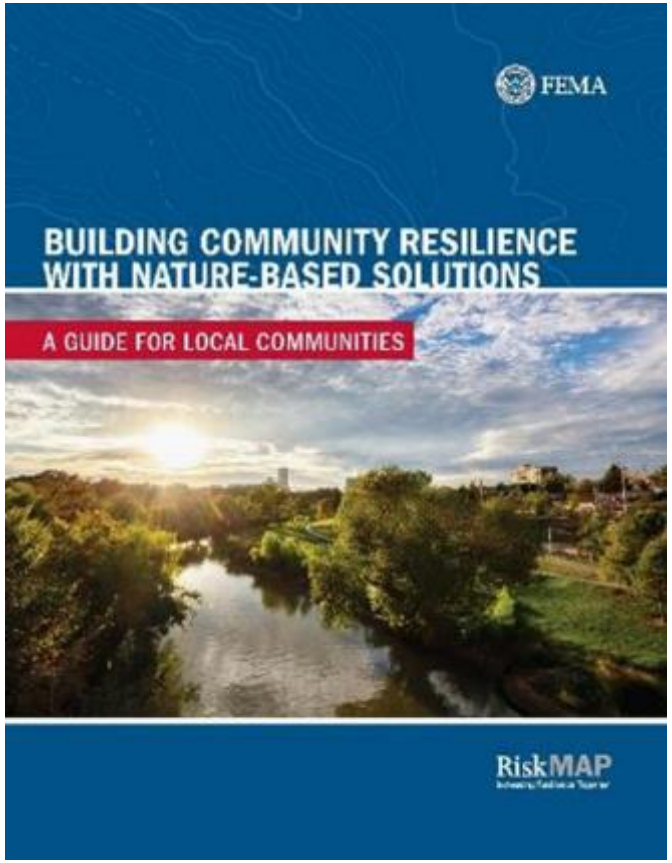
- National Climate Assessment: https://nca2018.globalchange.gov/
- Climate Resilience Toolkit: https://toolkit.climate.gov/
  - Climate Explorer: https://crt-climate-explorer.nemac.org/
- Digital Coast: https://coast.noaa.gov/digitalcoast
  - Sea Level Rise Viewer: https://coast.noaa.gov/slr
  - Coastal Flood Explorer Mapper: https://coast.noaa.gov/floodexposure/
  - Natural Infrastructure Topic: https://coast.noaa.gov/digitalcoast/topics/green-infrastructure.html

Nature-Based Mitigation

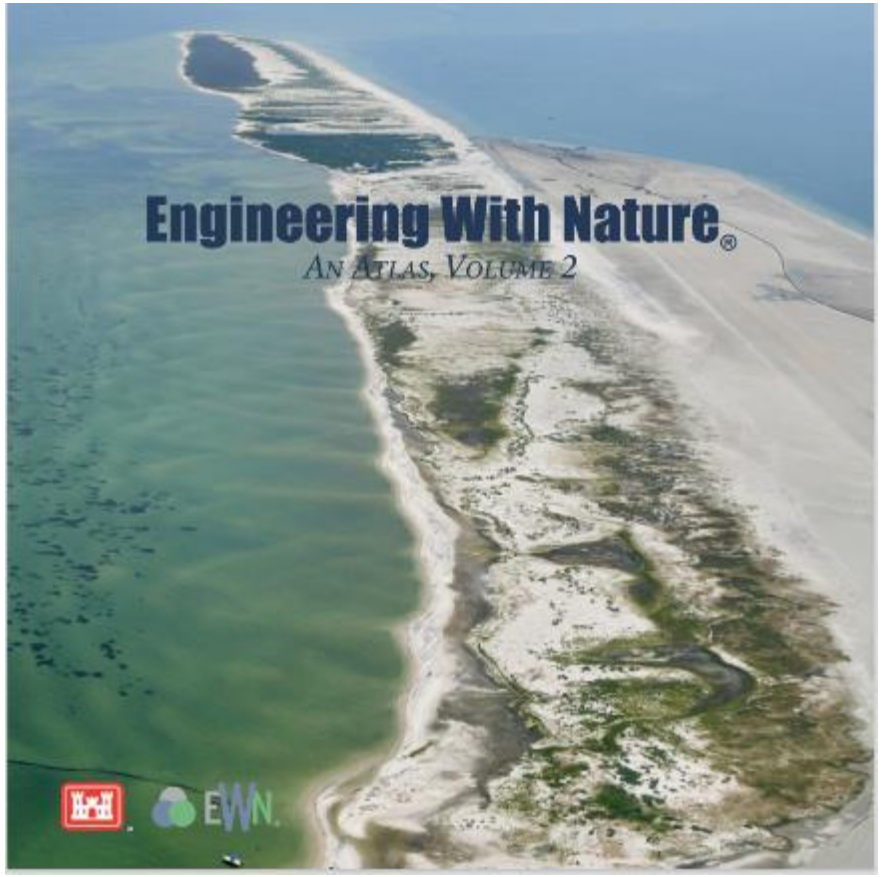
Sarah Murdock, The Nature Conservancy

The Nature Conservancy Vision

What are Nature-Based Solutions?



https://www.fema.gov/sites/default/files/documents/fema_riskmap-nature-based-solutions-guide_2021.pdf



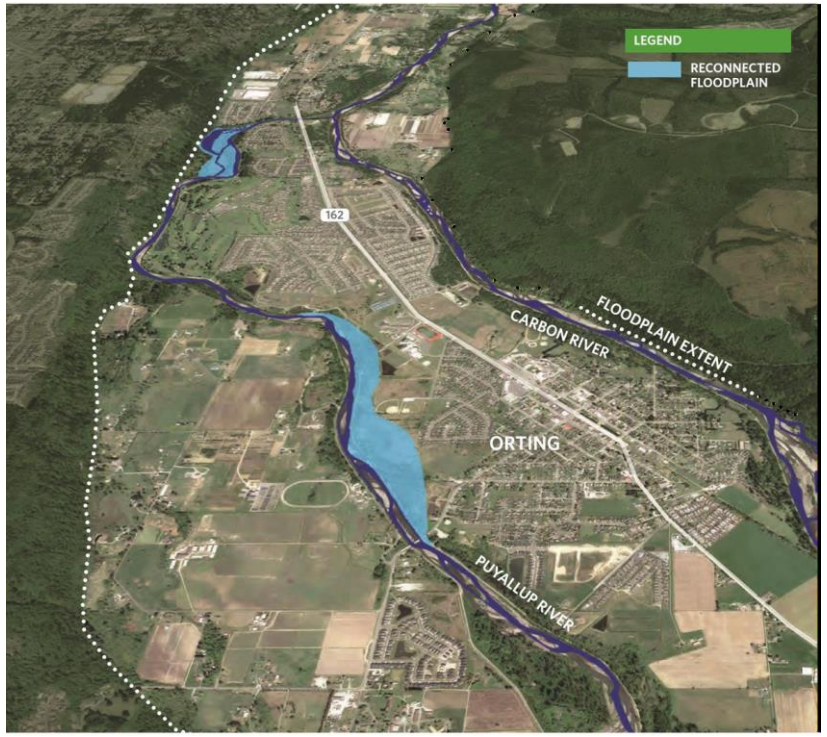
EWN | An Atlas (dren.mil)

Naturally Resilient Communities (nrcsolutions.org)

Natural Infrastructure (noaa.gov)

Nature-Based Investments Deliver Risk Reduction Benefits

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

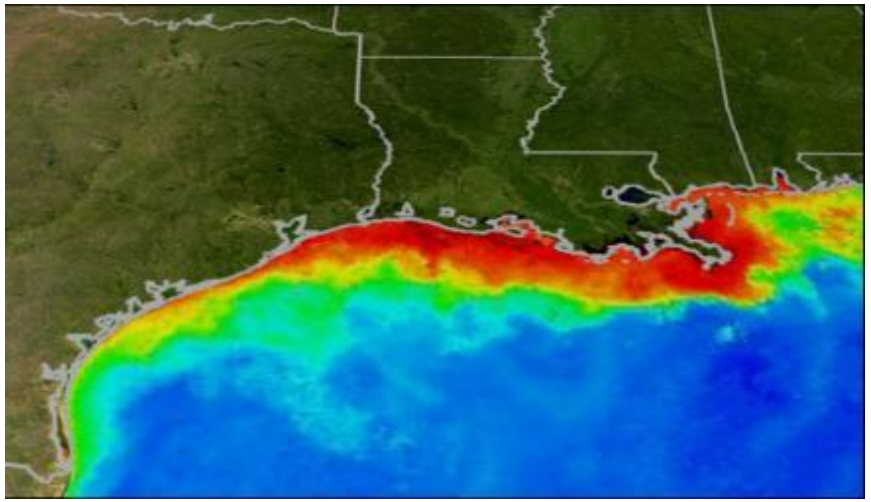


Puyallup River, Orting, WA – Levee setback, floodplain restoration

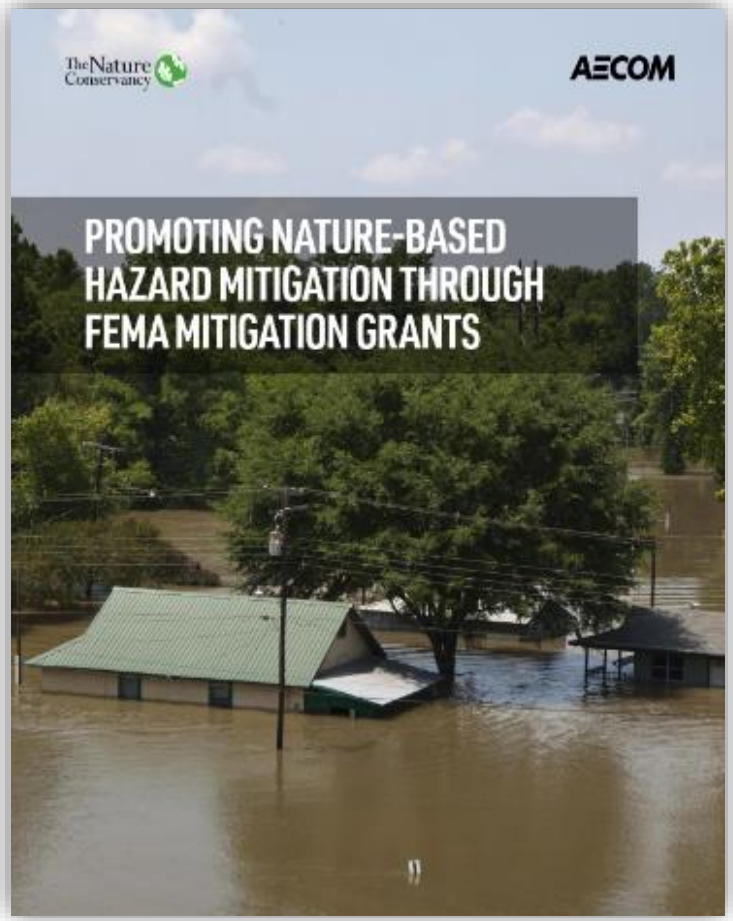
National Weather Service, **“THE THREAT OF FLOODING NO LONGER OCCURS AT THE LOW THRESHOLD OF 4500 CFS BUT AT THE MUCH HIGHER LEVEL OF 10000 CF”**

The Nature Conservancy

Nature-Based Investments Deliver Multiple Benefits



New Guidebook: Accessing FEMA Mitigation Grants for NBS Projects



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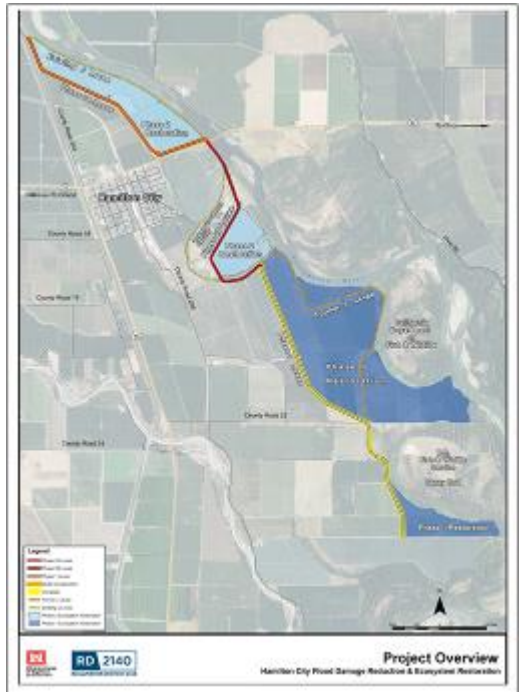
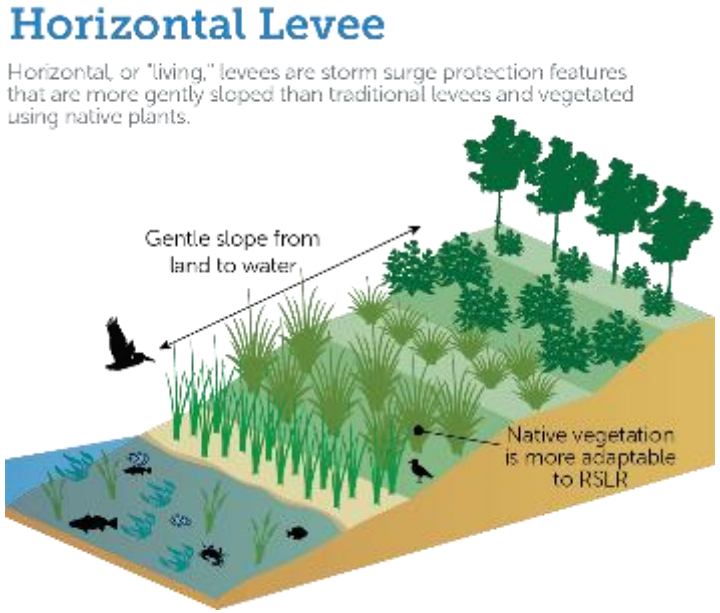
www.nature.org/femaguide

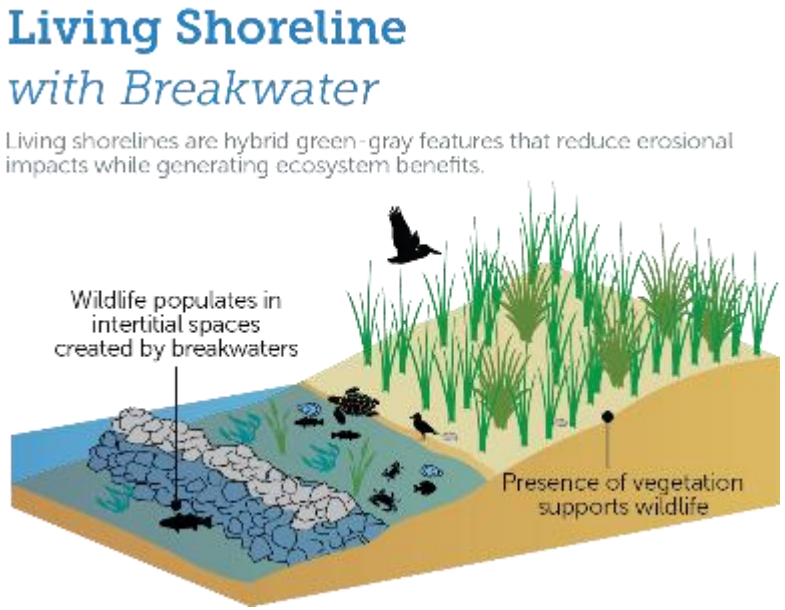
Riverine and Urban Mitigation Project Types





- Greenways
- Culvert Upgrades
- Daylighting
- Low Impact Development
- Stormwater Parks
- Riparian Buffer
- Stream/River Restoration
- Horizontal Setback Levee
- Floodplain Restoration
- Dam Removal
- Land Conservation

Coastal Storm Surge Nature-Based Mitigation Project Types



Coastal wetlands restoration, Middle Township, NJ

Coastal wetlands, shoreline, channel, restoration, Lighting Point, Bayou La Batre, LA

- Culvert Upgrades
- Waterfront Parks
- Tidal Circulation
- Living Shorelines
- Channel Restoration
- Beach and Dunes
- Coral Reef Restoration
- Coastal Wetlands Restoration
- Land Conservation

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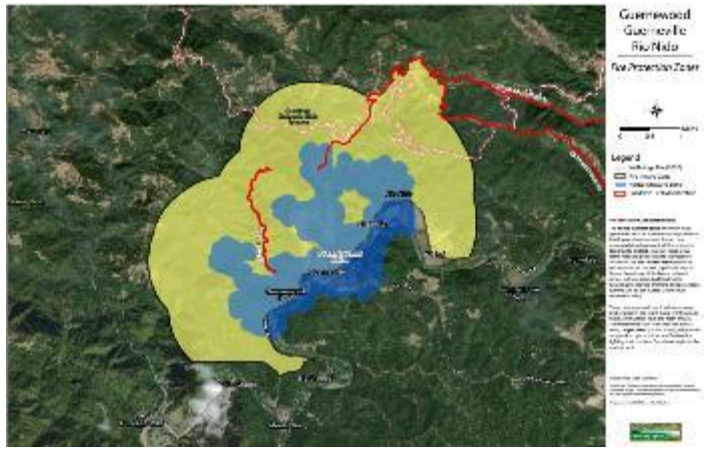
Wildfire Nature-Based Mitigation Techniques



Sonoma Country, CA comprehensive wildfire risk reduction plan

- Post-Fire Urban Debris Removal
- Post-Fire Hazard Tree Removal
- Vegetation Management
- Forest Thinning
- Forest Regeneration
- Forest Diversification
- Fire- and Ignition-Resistant Roofing
- Retrofit for Ignition Resistant Building Materials
- Fire-Resistant Landscaping
- Pruning Requirements to Reduce Fuel Loads
- Post-Fire Soil Stabilization
- Establishing Defensible Space

The Nature Conservancy

Guidebook Section 4: Quantifying Benefits from NBS

TABLE 4-4. ECOSYSTEM SERVICES VALUED IN FEMA BCA TOOLKIT

Ecosystem Service	Green Open Space	Riparian	Forest	Wetland	Marine and Estuary
Aesthetic Value	X	X		X	
Air Quality	X	X			
Biological Control		X			
Climate Regulation	X	X	X	X	X
Erosion Control	X	X			
Flood Hazard Reduction		X	X		
Food Provisioning		X			
Habitat		X			X
Nutrient Cycling				X	X
Pollination	X				
Recreation/Tourism	X	X			
Storm Water Retention	X				
Water Filtration		X		X	
Water Supply		X	X	X	

Traditional benefits recognized by BCA tool

- Avoided physical damage
- Avoided loss-of-function costs
- Avoided casualties
- Avoided emergency management costs

NBS projects additional benefits:

- Riparian space created
- Green open space acreage created
- Riparian wetlands acreage created or restored
- Coastal wetlands restored or created
- Marine and estuarine spaces restored or conserved
- Coastal forests restored or created
- Forests restored by acre

Qualitative Benefits: *Supporting benefits used in competitive project scoring*

Riverine/Urban Flooding	*Coastal Flooding*	*Wildfire*
Preventing development in flood-prone area	Wave and wind attenuation	Landslide protection
Climate change mitigation	Sea level rise mitigation	Improved evacuation / supply access routes
Soil and bank stabilization	Improved evacuation / supply access routes	
Preserving habitat and open space	Soil and bank stabilization	
Sediment capture	Preserving habitat and open space	

Guidebook: Case Studies

Santa Clara Pueblo Wildfire Recovery and Resilience, Rio Arriba County, NM

Suffolk County Wetland Restoration, Suffolk County, NY

Cardiff State Beach Living Shoreline, San Diego, CA

Calistoga Reach Levee Setback and Side Channel Construction, Pierce County, WA

Rice Canyon – City of Chula Vista Vegetation Management and Wildlife Risk Reduction, San Diego, CA

Mirabeau Water Garden, New Orleans, LA

- Project Description
- NBS Solution
- Project Development and Application
- Relevance to FEMA Hazard Mitigation Assistance

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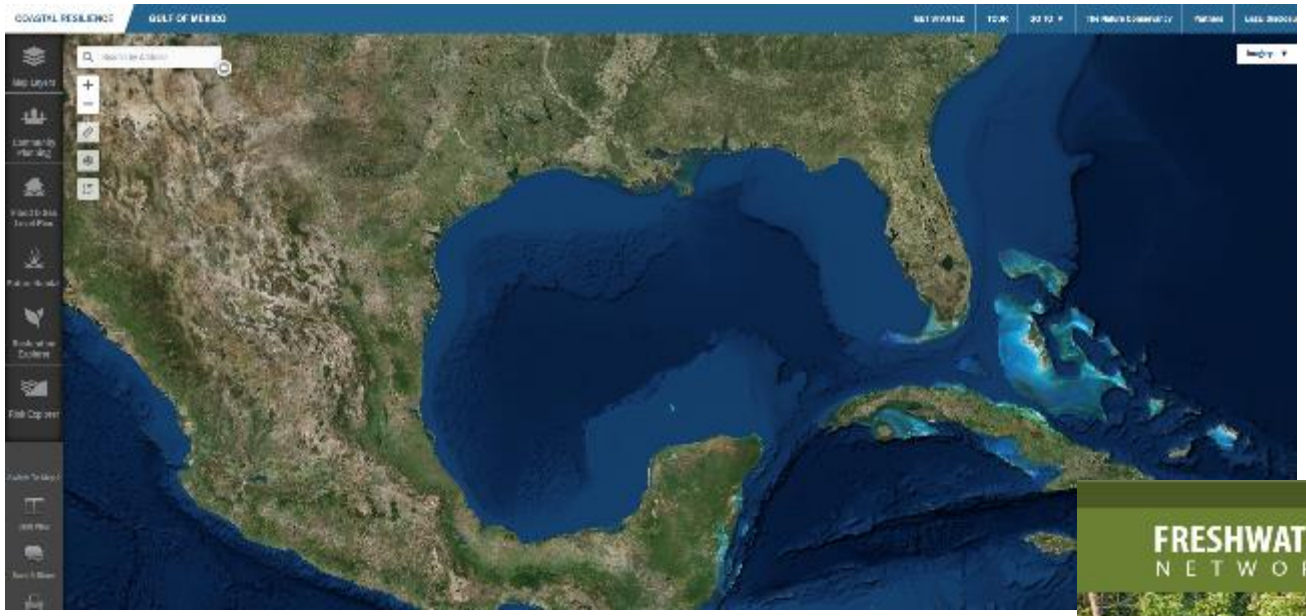
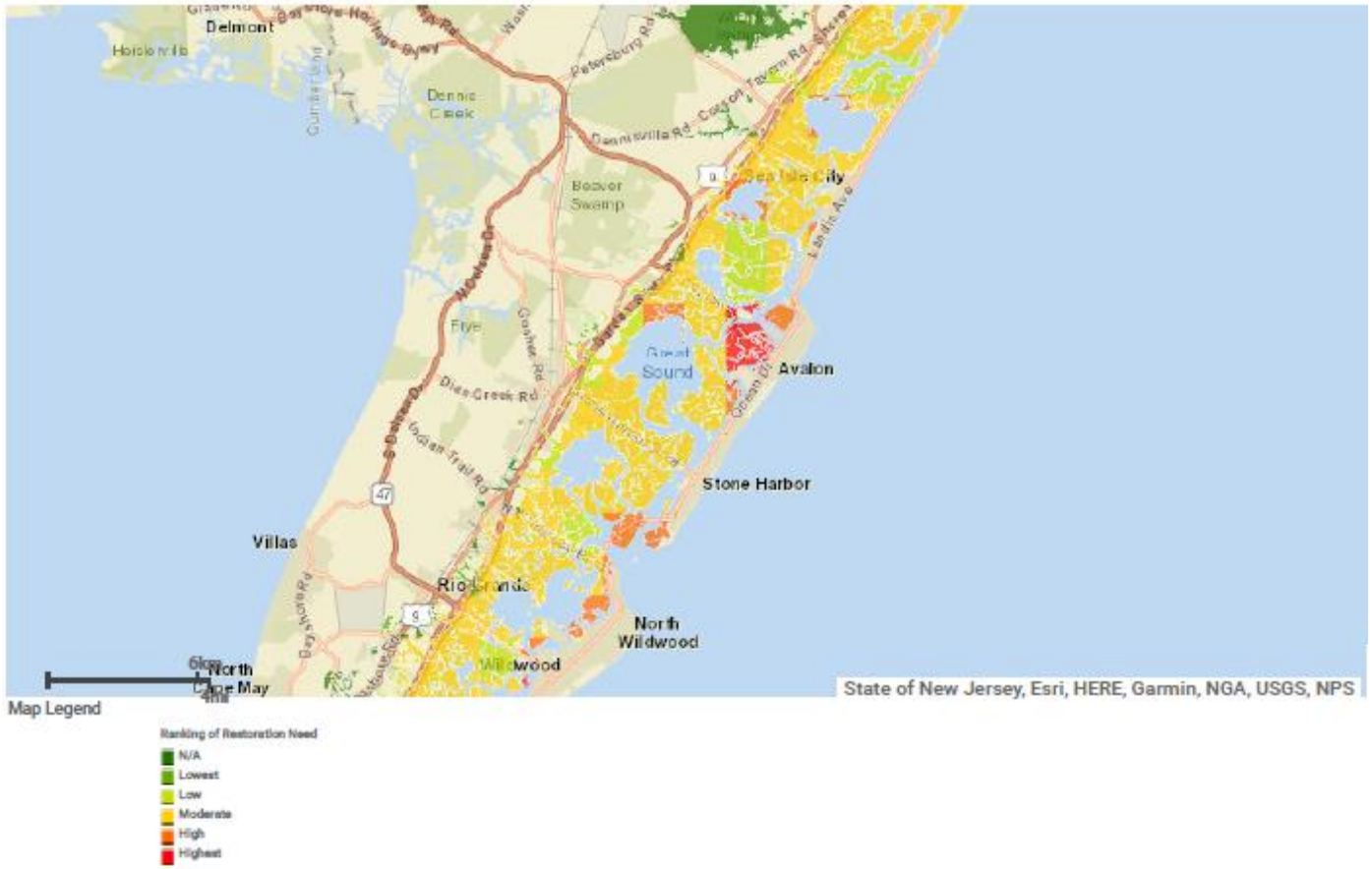
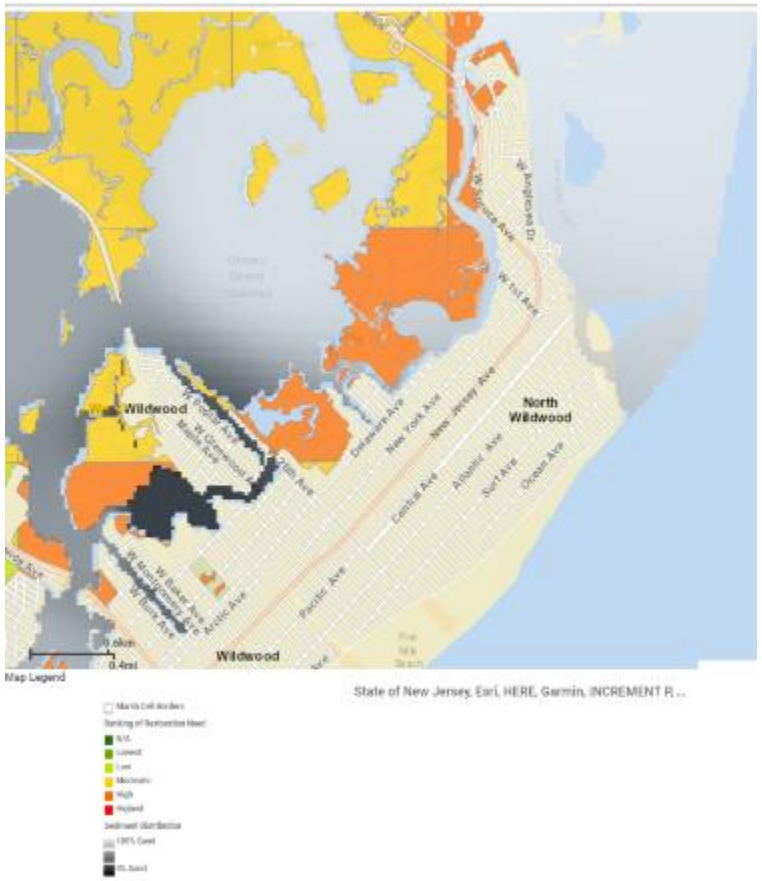
TNC Tools to analyze risk and NBS opportunities



The Nature Conservancy

New Jersey: Coastal Resilience Tool; Marsh Explorer





[Coastal Resilience | New Jersey]

Freshwater Network - Mississippi River Basin Floodplain Tool

The Floodplains Prioritization Tool (FP Tool) is designed to identify critical opportunities for floodplain protection and restoration in the Mississippi River Basin. Use the selector widgets below to specify criteria related to water quality, wildlife habitat, and human exposure to flood risk. The map on the right will change in response to your selections to identify sites meeting these criteria and identify those geographies where floodplain restoration or conservation is likely to have the greatest positive impact on the health of this river system.

Identify Floodplain Units

Select Flood Frequency

1-in-5-year | 1-in-100-year | 1-in-500-year

View Floodplains By Watershed

Zoom in to Activate

HUC-8 | HUC-12 | Catchment

Select Management Action

Protection | Restoration

Filter Floodplain Units

Available Floodplain Area

Available floodplain area for given flood frequency and management action

0 to > 40,000 acres

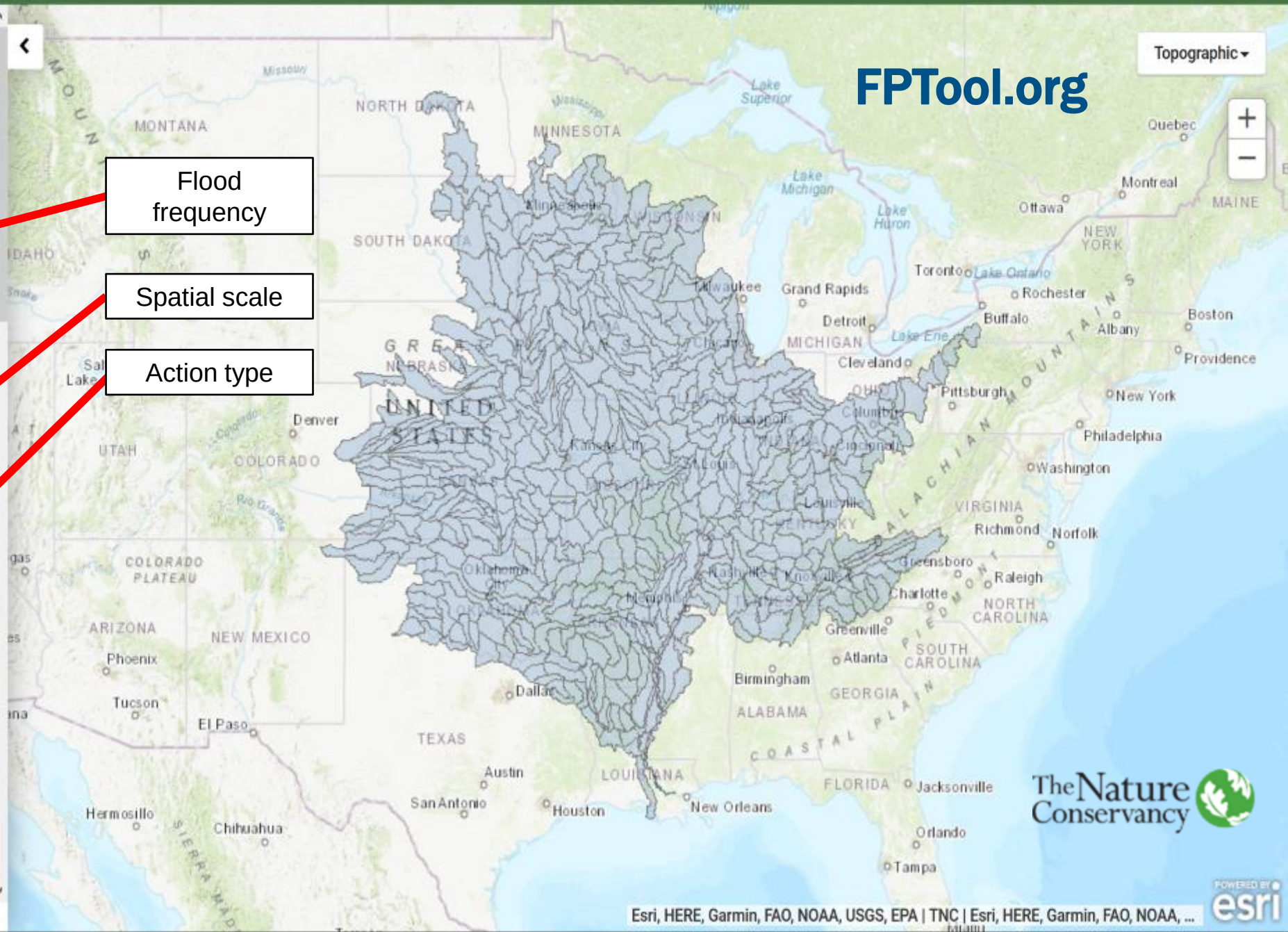
Nutrients

Local Nutrient Loading

Flood frequency

Spatial scale

Action type



Habitat

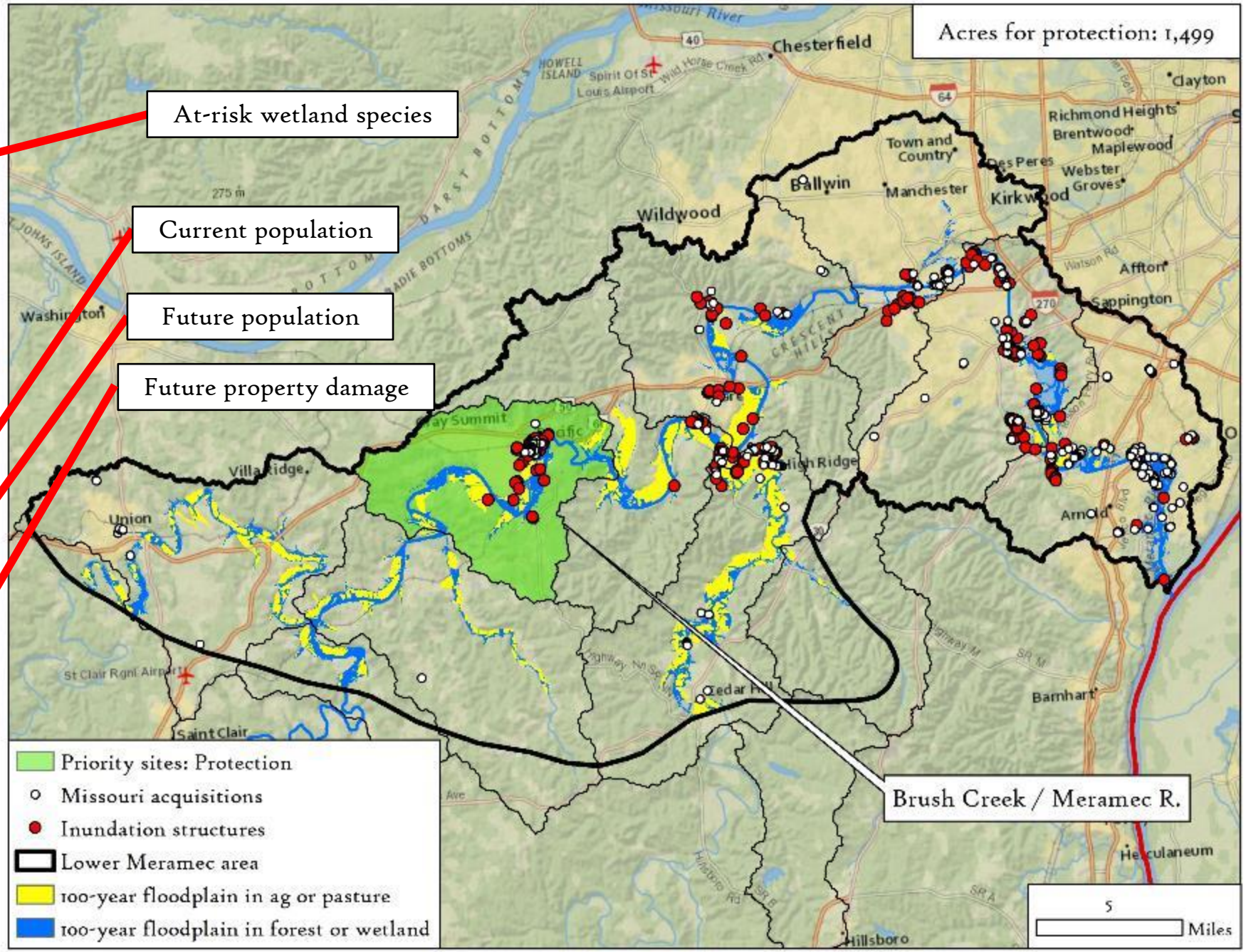
- Important Bird Areas — Present / Absent
- TNC Ecoregional Assessment Units — Present / Absent
- At-Risk Wetland Species — 1 to 8
- USFWS Threatened & Endangered Species Active Critical Habitat — Present / Absent
- American Bird Conservancy Corridors & Key Habitat Bird Areas — Present / Absent
- National Fish Habitat Partnership Cumulative Habitat Condition Index — 0 to 5

Population Exposure

- Current population — 1 to > 10
- Projected population (2050) — 100 to > 1,000

Future Economic Assset Exposure

- Economic asset exposure (2050) (SSP2) — 10M to > 50M



Criteria for PROTECTION:

- At least 1,000 acres of floodplain in forest or wetland
- Bottom 50% for nutrient loading
- Nonzero current pop. & projected 2050 pop. >100 ppl.
- Projected 2050 flood damage >=$10,000,000
- Presence of at-risk wetland species

Discussion

Wrap Up

2021 BRIC and FMA Programs Webinar Series

Date and Time	Webinar Topic
July 28 2-3:30 pm ET	Climate Change, Future Conditions, and Nature-based Solutions
August 11 4-5:30 pm ET	BRIC and FMA FY 2021 NOFO Webinar #1
August 16 2-3:30 pm ET	BRIC and FMA FY 2020 Data and Trends
August 18 2-3:30 pm ET	Where Equity Fits into the BRIC and FMA Program Design and Community Resilience
August 24 2-3:30 pm ET	Severe Repetitive Loss/Repetitive Loss Mitigation Priorities
August 26 2-3:30 pm ET	BRIC and FMA FY 2021 NOFO Webinar #2
September 8 2-3:30 pm ET	BRIC FY 2021 NOFO Technical and Qualitative Criteria
September 13 2-3:30 pm ET	BRIC and FMA FY 2021 NOFO Tribal Webinar
October 13 2-3:30 pm ET	Federal Agency Roundtable

2021 BRIC and FMA Programs Webinars and Office Hours

- Avoiding Application Pitfalls Webinars:
  - September 1 and 20
- FEMA's Hazard Mitigation Assistance Division will hold office hours for the BRIC and FMA Programs on the following dates:
  - October 19, 21, 26, and 28

Full schedule of BRIC and FMA Programs Webinars available at: https://www.fema.gov/grants/mitigation/2021-building-resilient-infrastructure-and-communities-and-flood-mitigation-assistance-programs

Resources and Information

- BRIC Website
- BRIC Resources
- Mitigation Action Portfolio
- Building Community Resilience with Nature-Based Solutions: A Guide for Local Communities
- July 2020 Webinar on BRIC and Nature-Based Solutions Presentation
- July 2020 Webinar on BRIC and Nature-Based Solutions Recording

Other Resources:

- FEMA Hazard Mitigation Planning: https://www.fema.gov/emergency-managers/risk-management/hazard-mitigation-planning
- FEMA GO Helpline: femago@fema.dhs.gov or 1-877-611-4700
- BCA Helpline: BCHelpline@fema.dhs.gov or 1-855-540-6744
- Building Science Helpline: FEMA-BuildingScienceHelp@fema.dhs.gov
- Environmental and Historic Preservation: EHPHelpline@fema.dhs.gov or 1-866-222-3580
- HMA Helpline: 1-866-222-3580

Sign up for BRIC and HMA Updates:
https://public.govdelivery.com/accounts/USDHSFEMA/subscriber/new?topic_id=USDHSFEMA_477

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Thank you!

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