Flood Resiliency Blueprint Update

Agriculture & Forestry Awareness Study Committee

August 29, 2024

Kenansville, NC

NORTH CAROLINA
Department of Environmental Quality

Agenda NC Flood Resiliency Blueprint

- Overview
- Blueprint Development
  - *The processes and tools that "Shall form the backbone of a State flood planning process"*
  - *Decision support tool*
- Blueprint Implementation
  - *Implementing resilience projects*

NC Flood Resiliency Blueprint Goals

- Serve as the backbone of State flood planning
- Increase community resilience to flooding
- Reduce the cost and complexity for local government in the planning and implementation of flood risk reduction projects
- **"...A successful blueprint should ultimately lead to a prioritized set of projects and funding strategies that the State can implement."**
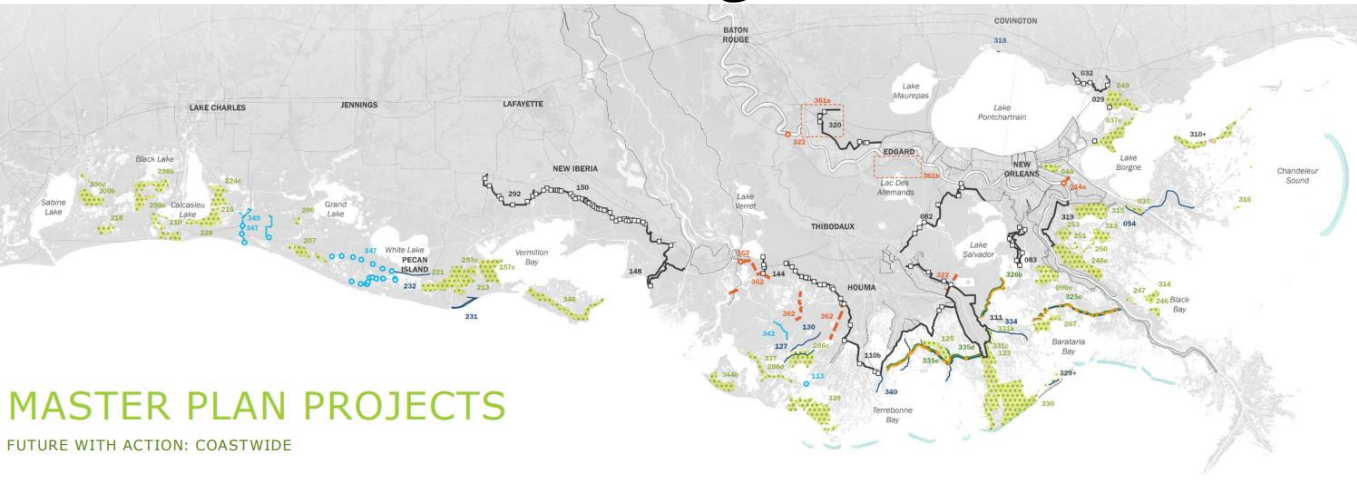
Basins: Neuse, Cape Fear, French Broad, Lumber, Tar-Pamlico, and White Oak
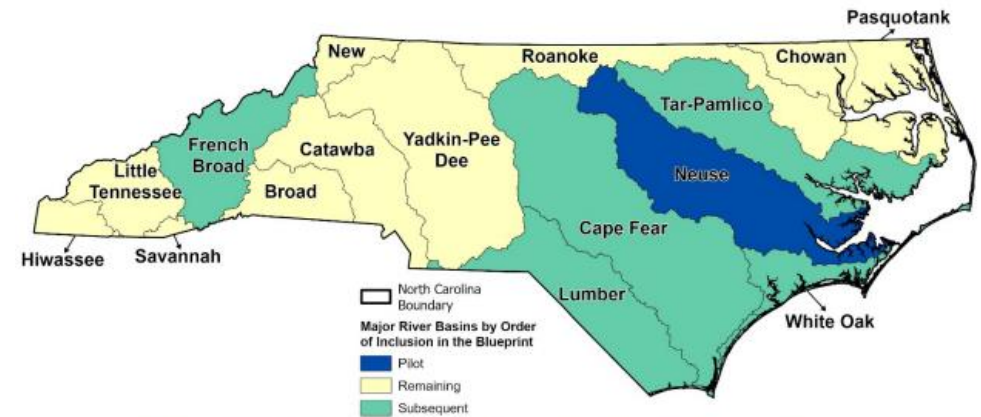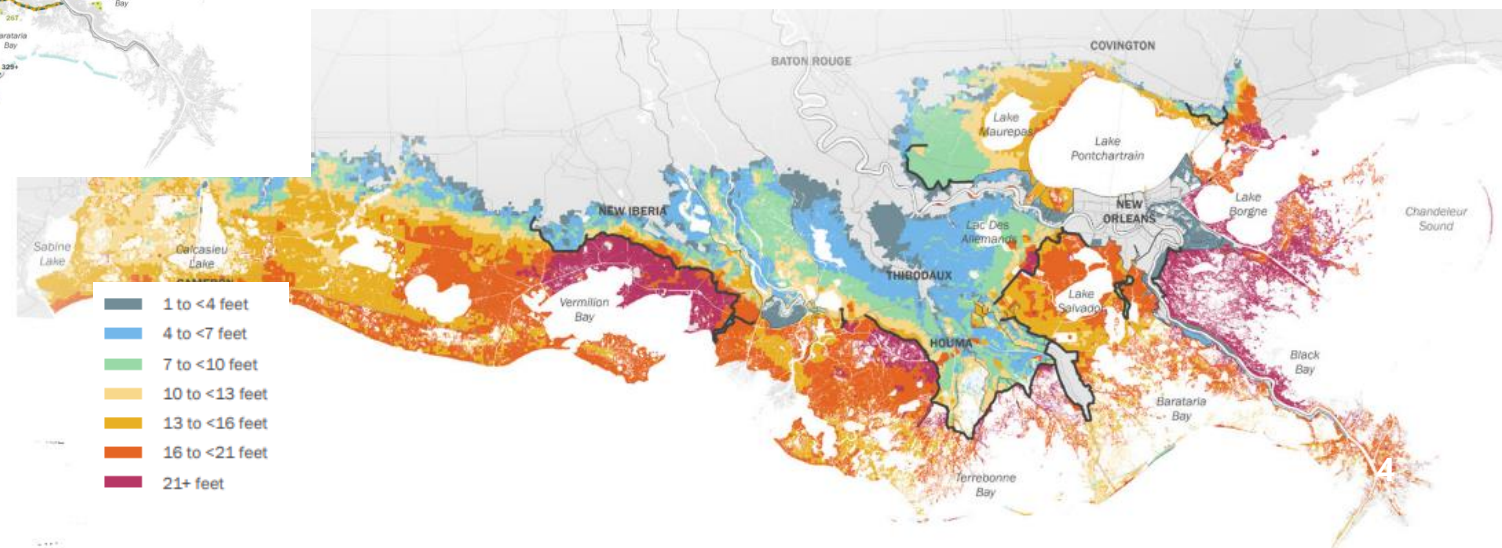
ES-Figure 3. North Carolina Major River Basins by Order of Inclusion in Blueprint

NC Flood Resiliency Blueprint Goals

- Build off "examples from other states such **as the Louisiana Coastal Master Plan** or the flood resiliency planning processes in South Carolina and Virginia."

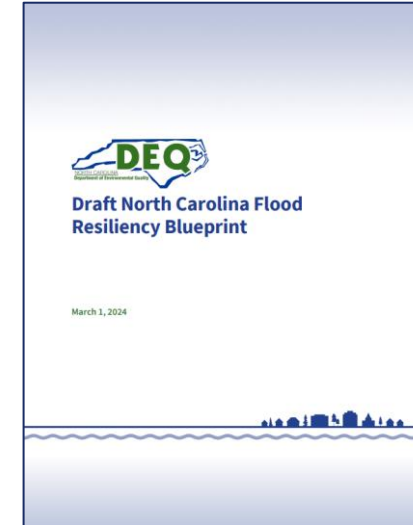MASTER PLAN PROJECTS

FUTURE WITH ACTION: COASTWIDE

▪	1 to <4 feet
▪	4 to <7 feet
▪	7 to <10 feet
▪	10 to <13 feet
▪	13 to <16 feet
▪	16 to <21 feet
▪	21+ feet

Louisiana – NC Comparison

Louisiana Master Plan	NC Flood Resilience Blueprint
Mature program • Mandated in 2005; First MP in 2007; First model-based plan in 2012; Now updated every 6 years • 15+ years of model development and improvement • Evaluate four types of risk reduction projects	**New program** • Leveraging and improving existing models and datasets • Developing unique tools/methodologies • Evaluate 30+ Resilience Action types
Risk Reduction • Prioritize investments to direct state funding • Educate – Illustrate how the coast is going to change and how that will impact communities	**Resilience** • Prioritizing state investments • Support local government's resilience planning and marshal funding

Process
 • 6-year cycle for:
  • Project development
  • Evaluation
  • Prioritization
	Process
	 • In-tool project development, evaluation, prioritization
	 • Led by local government empowered to identify, evaluate, and prioritize resilience actions

# Blueprint Development - Multiphase Process

- **Phase I** *(2022 - 2024) - Complete*
  - Research and evaluation
  - Gap analysis
  - Recommendations and decisions (Programmatic, Policy, Tools, Approaches, Needs)
  - Neuse River Basin Action Strategy (Pilot)
  - Draft Blueprint
- **Phase II** *(2023 - 2025) - Ongoing*
  - Develop online decision support tool (Blueprint Tool)
  - Begin implementation
- **Phase III** *(2024 - 2025) - Ongoing*
  - Develop Action Strategies for five prioritized areas
  - Refine of Decision Support Tool
  - Continue Blueprint implementation
  - Refine Blueprint and Neuse Action Strategy (including additional modeling)


Community Engagement Q&A Meeting in Canton, 6/22/2023

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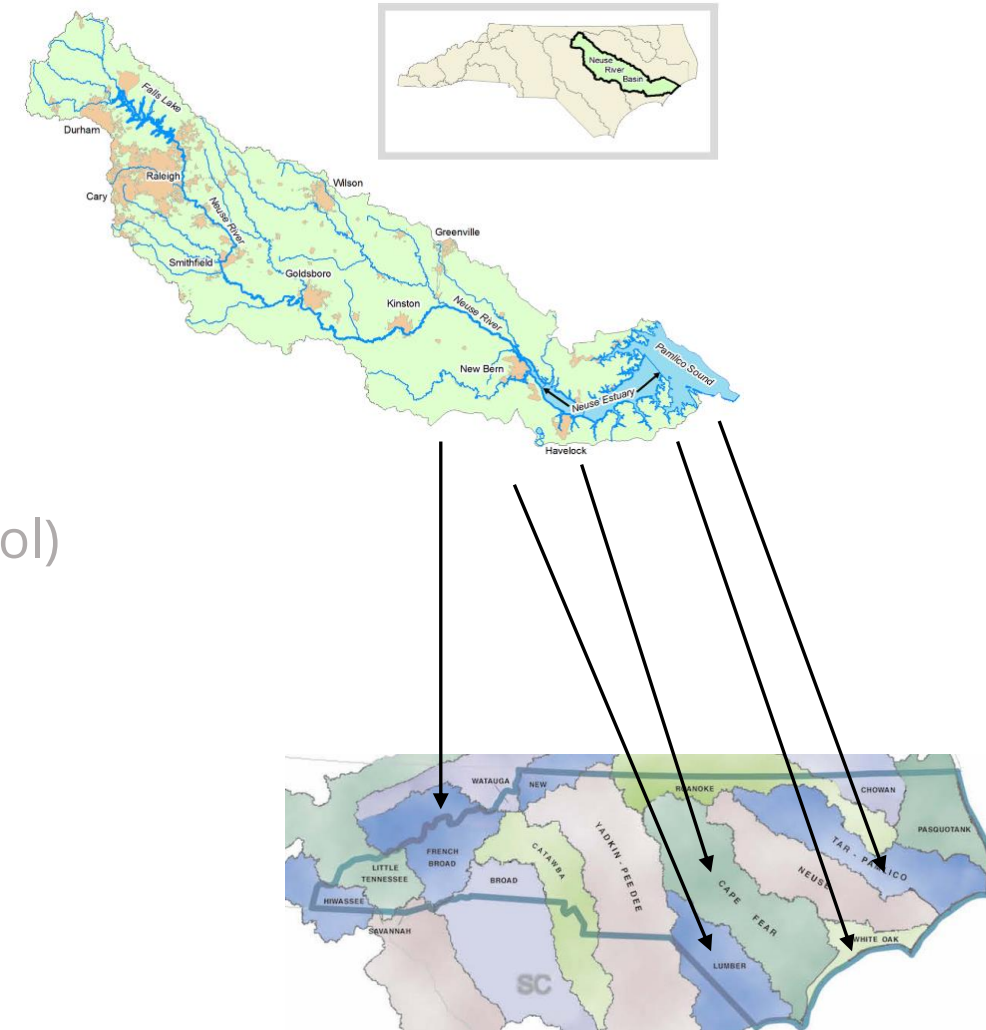
Flood Resiliency Blueprint Tool

NC Flood Resiliency Blueprint Tool

- Built on Hydrologic and Hydraulic (H&H) models
  - New methodologies allow users to:
    - Develop, Evaluate, Prioritize Resilience Actions
    - Plan and marshal funding to implement priority resilience measures

- Who is the Tool for:
  - Local governments
    - planners, floodplain managers
  - Fellow state agencies
  - Policymakers
  - Soil and Water Conservation District Staff, NRCS staff, SeaGrant extension, COG members
  - Public
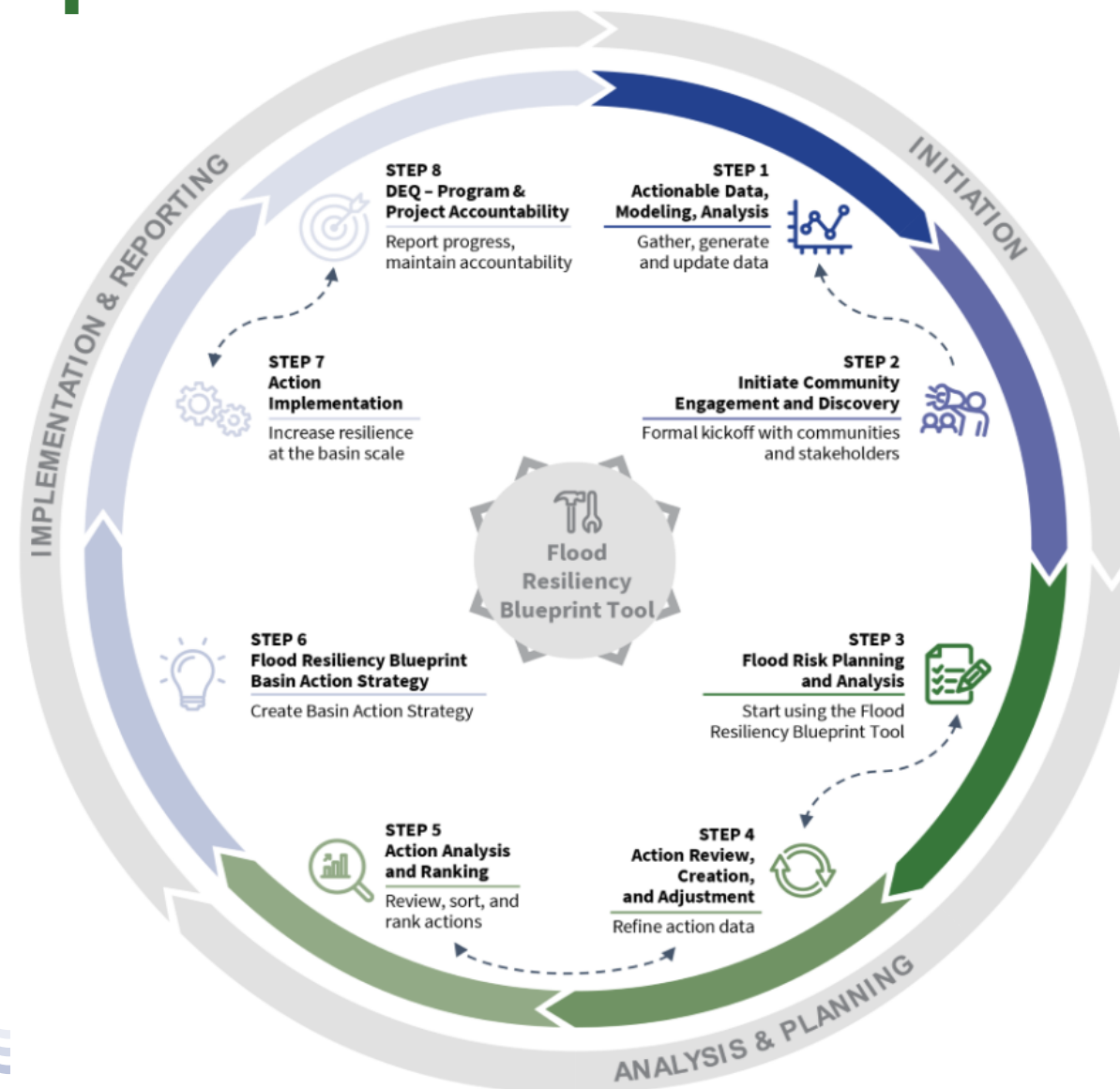
NC Flood Resiliency Blueprint Tool

Tool Development and **Model Improvement**

- April 2024 - Beta Testing
- September 2024 – Version 1 - *Testing*
- Spring 2025 – Version 2 - *Public*
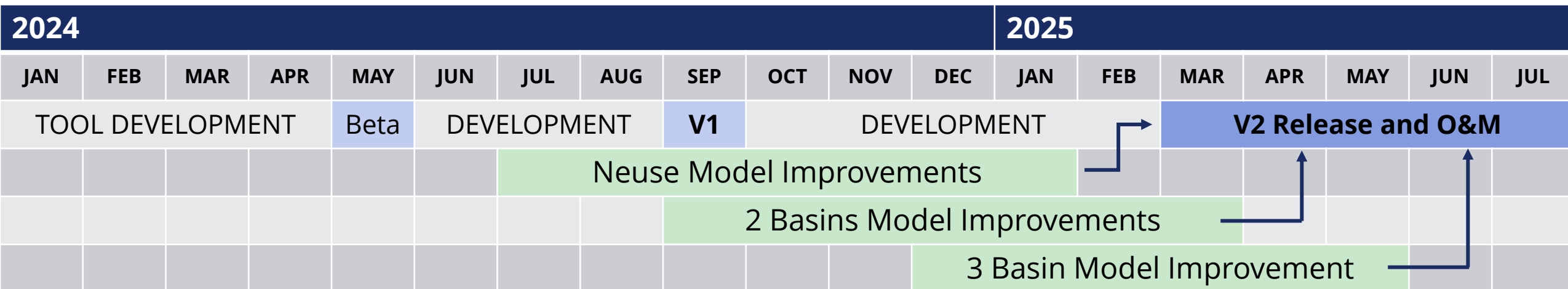
2024												2025						
JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL
TOOL DEVELOPMENT				Beta	DEVELOPMENT			V1	DEVELOPMENT					V2 Release and O&M				
								Neuse Model Improvements										
									2 Basins Model Improvements									
											3 Basin Model Improvement						

Flood Resiliency Blueprint Model Improvements

Better define flood extent and exposure

- Current Conditions

- Capture *future* flooding
  - Changes in precipitation patterns
  - Sea level rise
  - Increased impervious surfaces
- Facilitate future improvements
  - Storm surge and compound flooding
  - Probabilistic framework
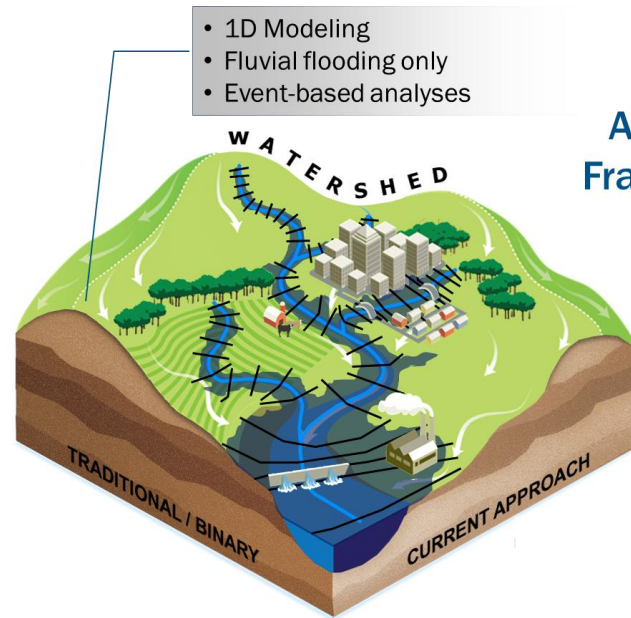
Support tool functionality

Analysis Framework

- 1D Modeling
- Fluvial flooding only
- Event-based analyses

WATERSHED

TRADITIONAL / BINARY   CURRENT APPROACH

Inland/Riverine Flooding Examples

WATERSHED

PROBABILISTIC / GRADUATED   FUTURE APPROACH
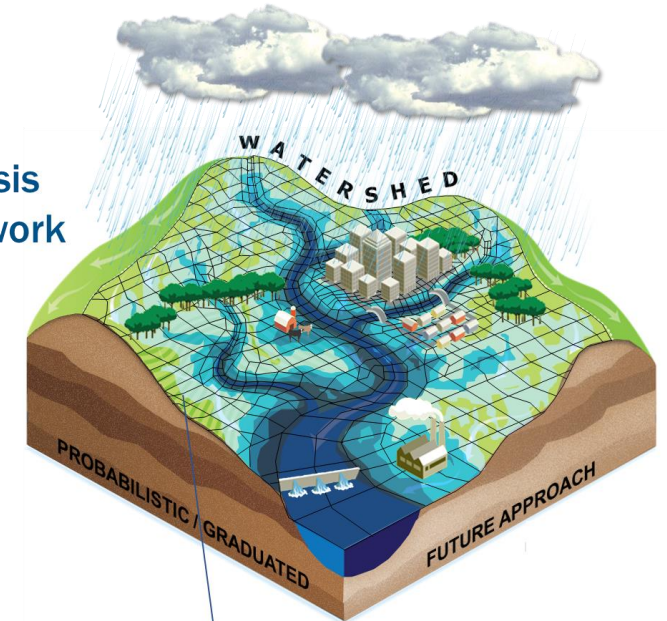
- 2D Modeling
- Fluvial and pluvial flooding
- Probabilistic analyses

Flood Resiliency Blueprint Model Improvements

ENERGY & ENVIRONMENT

Nearly $10B in Hurricane Debby damage occurred in areas without flood insurance requirements

BY SAUL ELBEIN - 08/13/24 12:36 PM ET

Study: U.S. Flood Damage Risk Is Underestimated

February 22, 2022 | Laura Oleniacz | 5-min. read

"According to a 2022 study from North Carolina State University, 68% of flood damage reports were outside of FEMA's high-risk flood zones in 2020 [and]... 16% of damage reports were in unmapped locations."

Flood Resiliency Blueprint Tool

1% Annual Chance

Regulatory Flood Plain
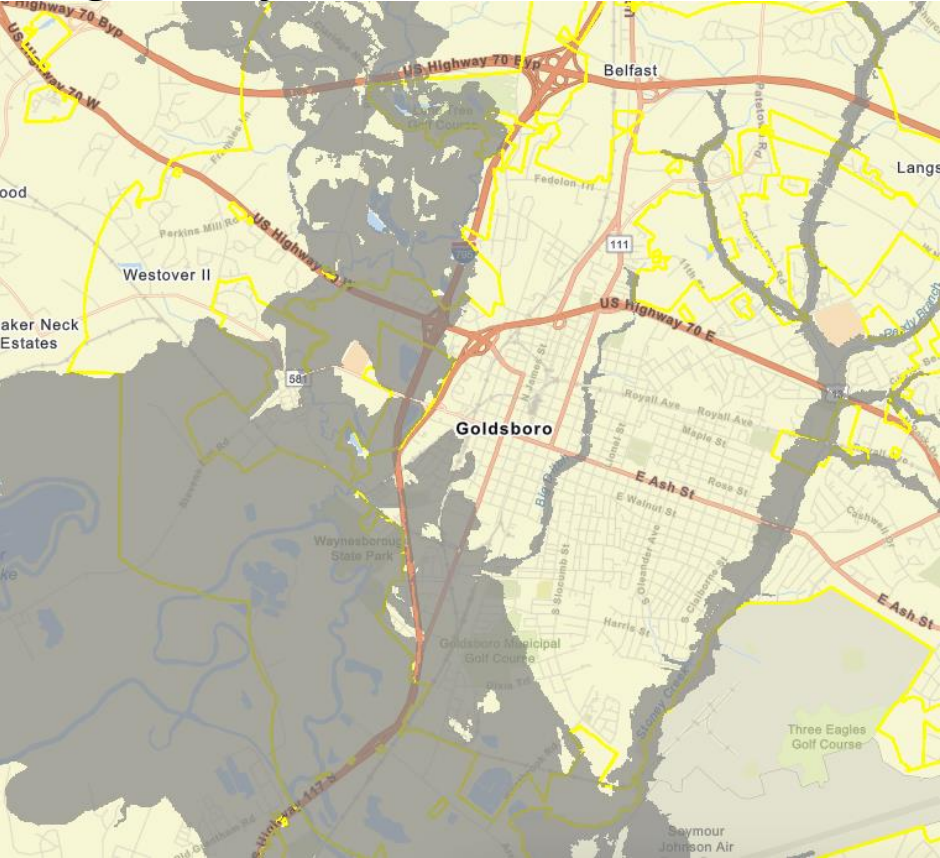
2D Rain on Grid

NCEM Advisory Flood Data

Flood Resiliency Blueprint Model Improvements

Better define flood extent and exposure

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- Facilitate future improvements

  - Improved surge and compound flooding
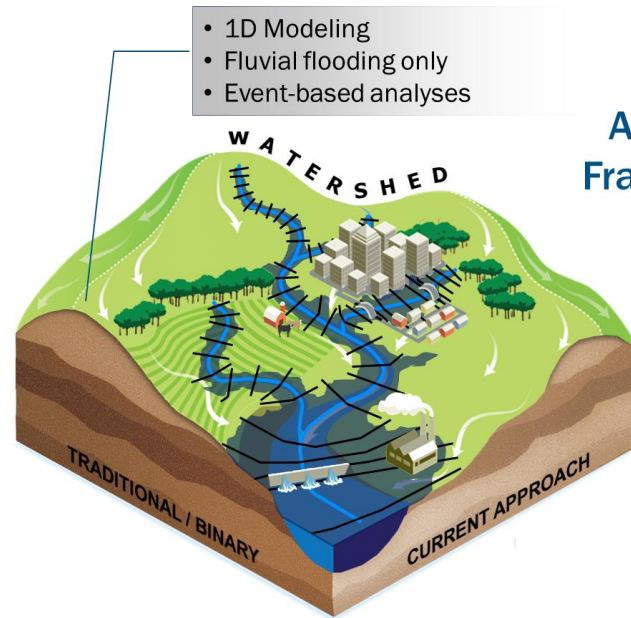
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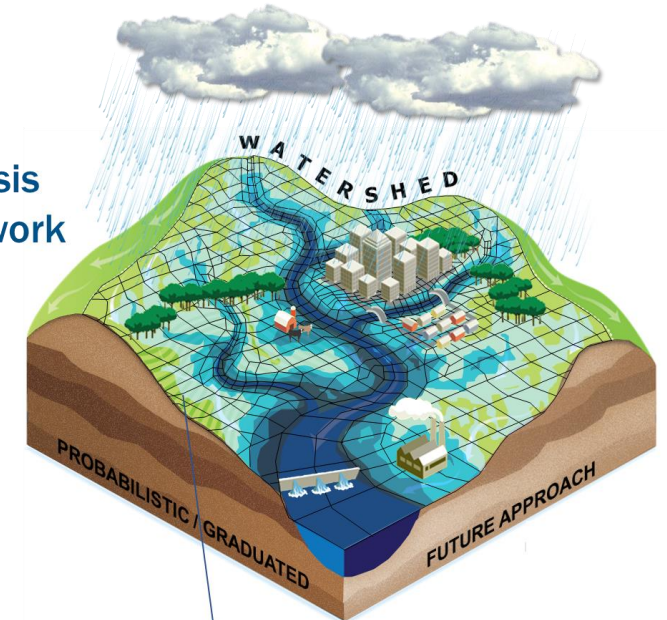
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Flood Resiliency Blueprint Tool

- Expands on existing tools with new data and methodologies

- Integrates forecasted changes

- Is scalable (catchment to statewide)

- Allows for integration of future data and logic generated through multiple sources

- **Is dynamic** and improves as data and methodologies improve

NC FRIS

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Blueprint Tool Functionality

Develop a Detailed Community Profile	Develop New Resilience Actions	Build a local Action Plan
Explore Flood Risk	Action Management (internal)	Fund Matching Tool
Project Complexity	Flood Risk Scores	Ranking Actions
Estimating Impacts of Flooding on People, Environment, Infrastructure, and Economic Sustainability +	Community Capacity	Data Repository

- Goals:
  - Be a resource for riverine and stream management to reduce flooding
  - Reduce the cost and complexity for local government in the planning and implementation of flood risk reduction projects
  - Lead to a prioritized set of projects

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Flood Resiliency Blueprint Tool

Develop a Detailed Community Profile

Build a Local Action Strategy

Develop New Resilience Actions

Flood Resiliency Blueprint Tool

Develop a Detailed Community Profile

Build a Local Action Strategy

Develop New Resilience Actions

Flood Resiliency Blueprint Tool

Develop a Detailed Community Profile

Build a Local Action Strategy

Develop New Resilience Actions

Add Pre-Identified Action

Add New, Known Action

Explore & Develop New Action

Flood Resiliency Blueprint Tool

Develop a Detailed Community Profile

Build a Local Action Strategy

Develop New Resilience Actions

Add Previously Identified Action

Flood Resiliency Blueprint Tool

Develop a Detailed Community Profile

Build a Local Action Strategy

Develop New Resilience Actions

Add New, Known Action

Explore & Develop New Action

Flood Resiliency Blueprint Tool

Develop New Resilience Actions

Identify an area of interest

Flood Resiliency Blueprint Tool

Develop New Resilience Actions

Assess flood Risk
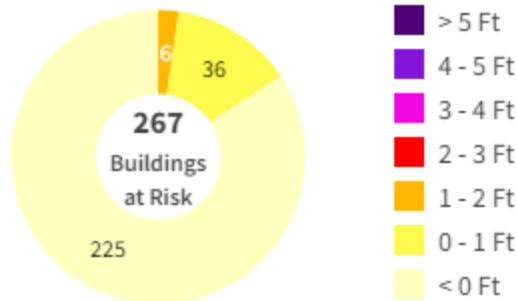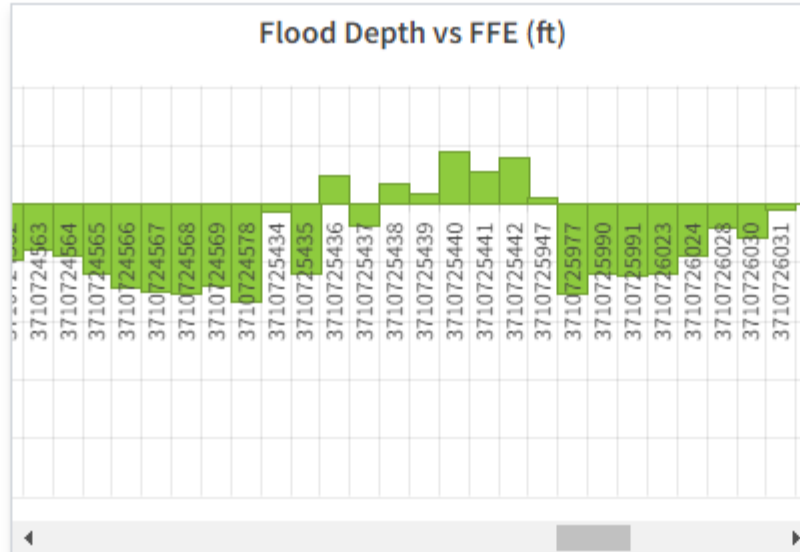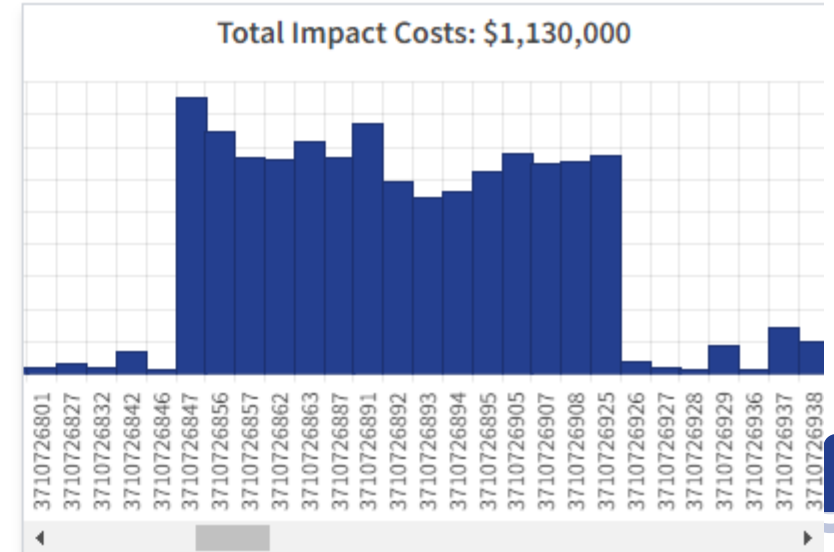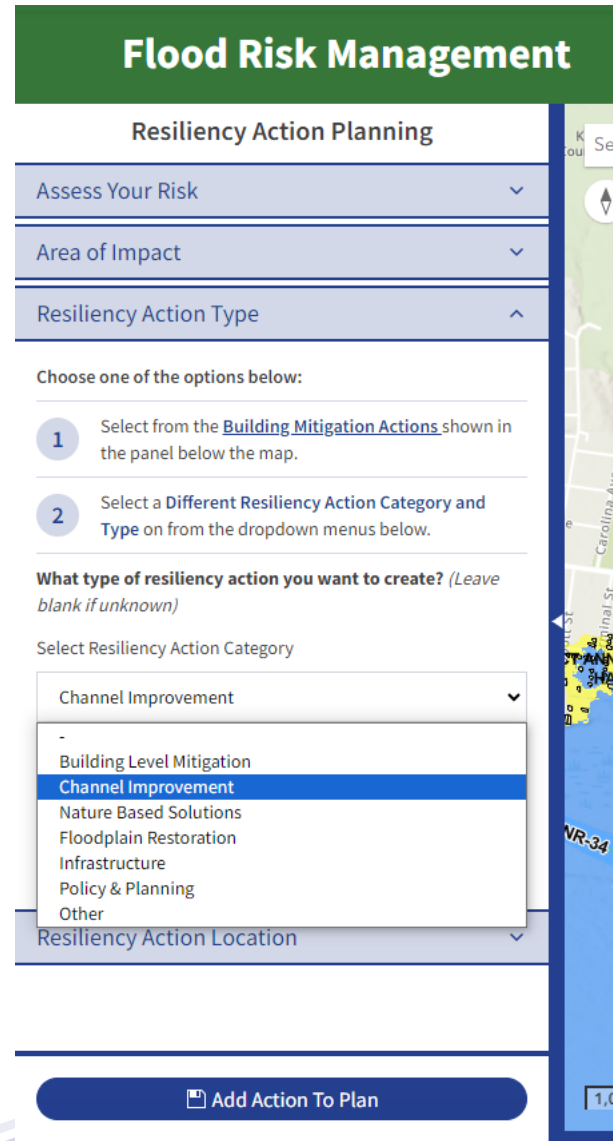
Flood Resiliency Blueprint Tool

Develop New Resilience Actions

Explore Resilience Actions

Resilience Action Categories

- Building level mitigation
- Detention/Runoff reduction
- Channel Improvement
- Nature Based Solutions
- Floodplain Restoration
- Infrastructure
- Policy and Planning

Flood Resiliency Blueprint Tool

* **Unique:** Distinctive, offering capabilities not available in any other tools

+ **Enhanced:** Exists in other tools, but the Blueprint Tool extends these functionalities significantly, enhancing them to provide greater efficiency and effectiveness

= **Leverage/Coordinated:** Leverages the capabilities of similar tools, coordinating to provide cohesive advancements in data and function.

Detention/Runoff Reduction

- Reduction New structures +
- Retrofit Existing structures +
- Quarries *
- Dry dams +

Floodplain Restoration

- Riparian buffers +
- Floodplain mitigation preservation *
- Floodplain restoration/Multi-use floodplains *

Nature-Based Solutions

- Water farming *
- Afforestation +
- Bioretention +
- Raingardens, bio-swales, etc. +
- Permeable pavement +
- Flood storage wetlands *
- Stream restoration =

Channel Improvement

- Debris removal =
- Channel dredging =
- Channel widening =

Building Level Mitigation

- Relocation =
- Utility elevation =
- Structural elevation =
- Reconstruction =
- Wet floodproofing =
- Dry floodproofing =
- Acquisition/ Demolition =

Infrastructure

- Levee =
- Dike/ Berm =
- Roadway elevation/ Road crossing modification =
- Stormwater management activities +

Policy & Planning

- Enhanced zoning *
- Land use/impervious area restrictions =
- River corridor/ Greenspace implementation *
- Stormwater, water quality, floodplain regulations =

Flood Resiliency Blueprint Tool

Develop New Resilience Actions

Stream Debris Removal

- Define Area of impact
- Define Action Location

Flood Resiliency Blueprint Tool

Develop a Detailed Community Profile

Build a Local Action Strategy

Develop New Resilience Actions

Flood Resiliency Blueprint Tool

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Fund Matching

- Match proposed resilience actions with funding opportunities
  - Actively updated
  - Federal, state, philanthropic programs

Flood Resiliency Blueprint Implementation

Project Implementation

- In 2021, the N.C. General Assembly allocated $96M to DMS, which became available Spring 2024, to implement priority flood resilience projects.

- As a first step in administering the funds, the Blueprint team is coordinating with fellow state agencies and programs with overlapping resilience priorities
  - Department of Agriculture's Streamflow Rehabilitation Assistance Program (StRAP)
  - N.C. Land and Water Fund,
  - N.C. Emergency Management

Project Implementation

Prioritizing projects based on:

- their ability to reduce flood damage to infrastructure, homes, businesses, etc.,

- whether the project has been identified in a Hazard Mitigation or Resilience Planning efforts,

- whether the project is in a high-risk area,

- their likelihood of reducing flood risk to underserved communities,

- whether the projects serve additional public benefit (e.g. parks, trails, etc.).

Flood Resiliency Blueprint Tool

- Planned Awards to date
  - (Work with NCEM not captured)

Partner	River Basin	Sum of Proposed DEQ Award
NCLWF	Cape Fear	$800,000.00
NCLWF	French Broad	$914,625.00
NCLWF	Lumber	$3,596,814.00
NCLWF	Neuse	$1,886,750.00
NCLWF	Tar-Pamlico	$704,809.00
NCLWF	White Oak	$1,150,000.00
NCLWF Total		**$9,052,998.00**
Other	Cape Fear	$1,500,000.00
Other	Lumber	$569,476.00
Other	Neuse	$110,000.00
Other	White Oak	$1,500,000.00
Other Total		**$3,679,476.00**
StRAP	Cape Fear	$921,775.00
StRAP	French Broad	$495,200.00
StRAP	Lumber	$975,500.00
StRAP	Neuse	$686,536.00
StRAP	Tar-Pamlico	$1,642,980.00
StRAP Total		**$4,721,991.00**
Grand Total		**$17,454,465.00**

DRAFT

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Closing

What's Next

Flood Resiliency Blueprint Program Consultants

|		
Jessica Gray *Cape Fear*	Shana Shapiro *Lumber*	Chris Dreps Tar-Pamlico
Suna Morkoc *French Broad*	Chris Dreps & Brad Connell *Neuse*	Brad Connell White Oak

What's Next

PHASE II - Tool Development and Model Improvement

- September 2024 – Version 1 Testing
- Spring 2025 – Version 2

What's Next

Phase III

- Blueprint contracting with vendors – *In Process*
- Supporting the development of Basin Action Strategies
  - Cape Fear, French Broad, Lumber, Tar-Pamlico, and White Oak
  - Establishing Basin Technical Advisory Committees
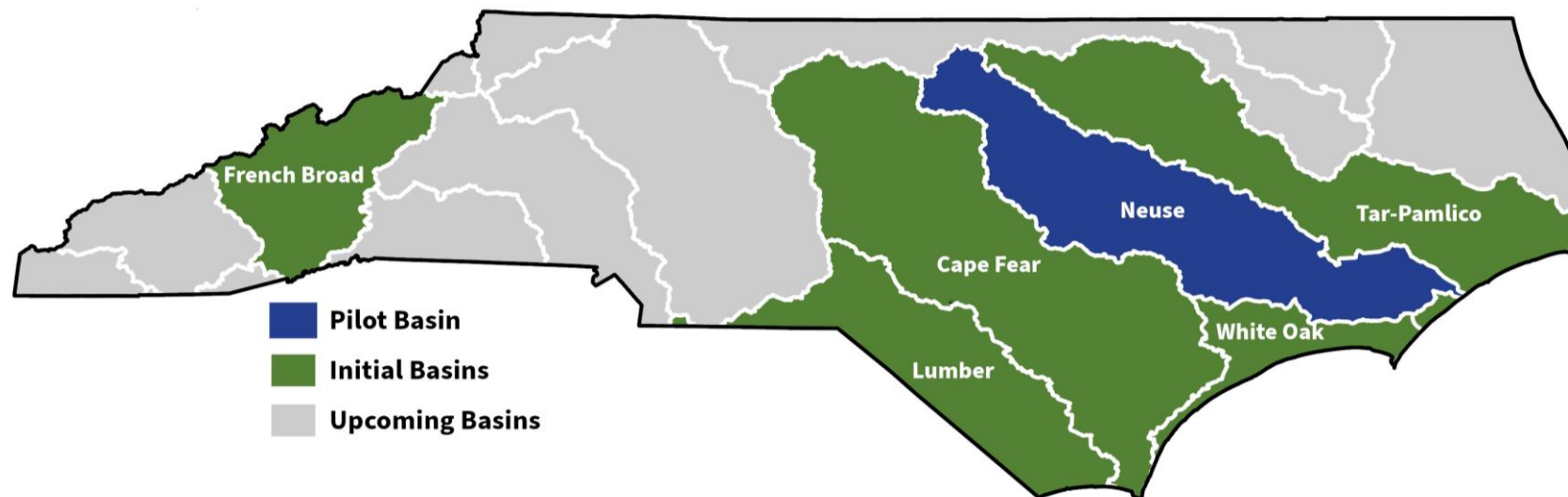
What's Next

Continued Implementation

- Working with NCEM
- Mining Hazard Mitigation plans and other planning efforts
- Agricultural Pond Flood Storage pilot project with Dept. of Agriculture

Thank You! | Questions?

Stu Brown

Blueprint Supervisor

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