

North Carolina Flood Resiliency Blueprint

Principal Advisory Group (PAG) Kickoff Meeting
March 22, 2023



Meeting Agenda

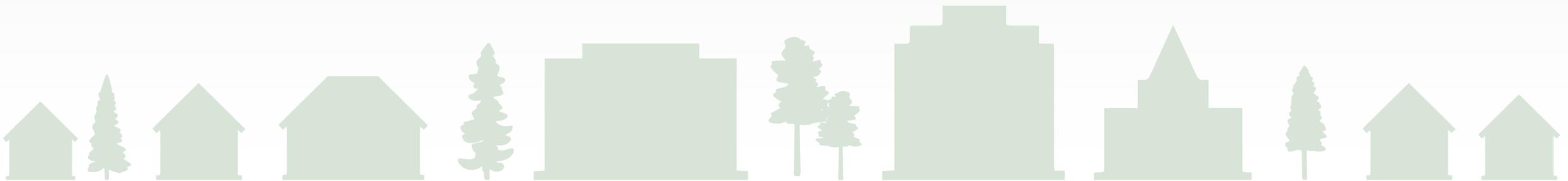


- Introductions
- DEQ Project Overview
- Overview of Phase I
- Principal Advisory Group Overview
- Technical Advisory Group Introductions and Kickoff Meeting Summary
 - Governance
 - Partnership/Funding
 - Hazard Identification
 - Vulnerability/Risk/Impact
 - Resilience/Mitigation/Reduction
 - Tool Development/Acceptance
 - Neuse Regional Advisory Group
- Open Discussion/Q&A



Introductions

All Participants





DEQ Project Overview

Elizabeth Christenson-Diver

Project Lead & Senior Policy Advisor, DEQ



DEQ Core Blueprint Team



Elizabeth Christenson, PhD
Project Lead & Senior Policy Advisor
Department of Environmental Quality



Marc Recktenwald
Director
Division of Mitigation Services



Michelle Ferree
Project Manager
Division of Mitigation Services



NC General Assembly: Session 2021



SESSION LAW 2021-180 SENATE BILL 105

SECTION 5.9.(c) Flood Resiliency Blueprint. – Of the funds allocated in subdivision (a)(1) of this section, the Department of Environmental Quality, Division of Mitigation Services (DMS), shall contract with an organization to develop a statewide Flood Resiliency Blueprint for major watersheds impacted by flooding, including, among others, the Cape Fear River and the Neuse River Basins. The watershed blueprint shall form the backbone of a State flood planning process that increases community resiliency to flooding, shall be a resource for riverine and stream management to reduce flooding, and should support the establishment and furtherance of local government stormwater maintenance programs. The blueprint shall identify the major watersheds affected by flooding and direct these funds toward the activities which are central to the creation of an actionable blueprint, namely flood risk assessment, identification of data gaps, and recommendations to reduce flood risk for each target watershed. When developing the blueprint with the organization selected, DMS shall ensure the blueprint incorporates local knowledge, community goals, projections of future flood risk, and the best available science and hydrologic modeling to create a decision tool for flood mitigation investments and strategies from local watersheds up to whole river basins. A successful blueprint should ultimately lead to a prioritized set of projects and funding strategies that the State can implement. DMS and the organization selected are encouraged to examine examples from other states such as the Louisiana Coastal Master Plan or the flood resiliency planning processes in South Carolina and Virginia. The organization shall send all necessary information to DMS on the implementation of the blueprint upon request by DMS. The organization shall submit an initial draft of the blueprint to DMS no later than December 31, 2023. DMS shall report by July 1, 2022, and annually thereafter to the Joint Legislative Commission on Governmental Operations and the Fiscal Research Division on the implementation of this subsection.

Goal

The Flood Resiliency Blueprint is designed to be a standardized flood resiliency approach and actionable, online decision-support tool for each major river basin in North Carolina. The Blueprint will allow state agencies, lawmakers, and regional and local government planners to prioritize and direct resources to implement effective flood resilience strategies.

Goal

The Flood Resiliency Blueprint is designed to be a standardized flood resiliency approach and actionable, online decision-support tool for each major river basin in North Carolina. The Blueprint will allow state agencies, lawmakers, and regional and local government planners to prioritize and direct resources to implement effective flood resilience strategies.

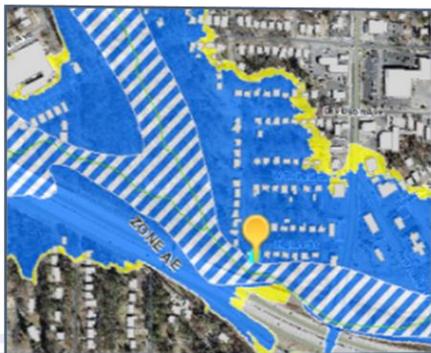
Visualize Flood Risk



Goal

The Flood Resiliency Blueprint is designed to be a standardized flood resiliency approach and develop an actionable, online decision-support tool for each major river basin in North Carolina. The Blueprint will allow state agencies, lawmakers, and regional and local government planners to prioritize and direct resources to implement effective flood resilience strategies.

Visualize Flood Risk Select Mitigation Alternatives



Goal

The Flood Resiliency Blueprint is designed to be an actionable, online decision-support tool for each major river basin in North Carolina. The Blueprint will allow state agencies, lawmakers, and regional and local government planners to prioritize and direct resources to implement effective flood resilience strategies.

Visualize Flood Risk Select Mitigation Alternatives Understand Impacts & Vulnerability

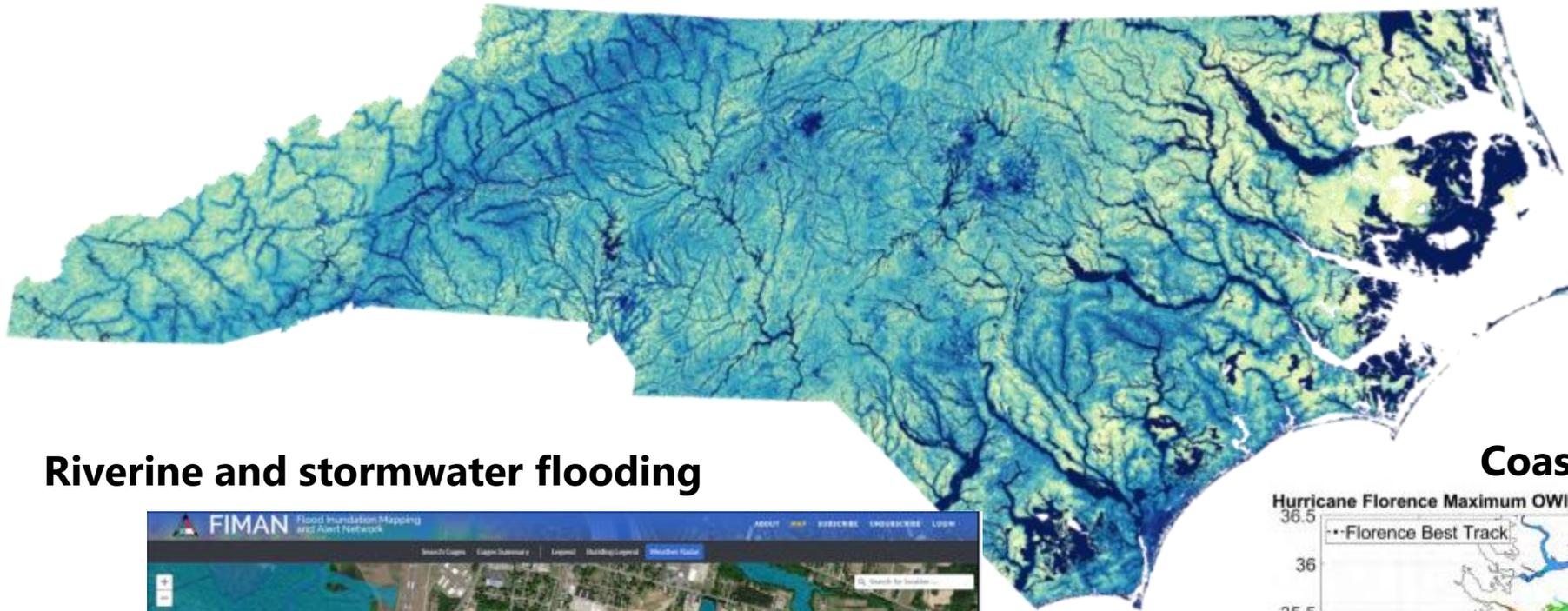


Definitions

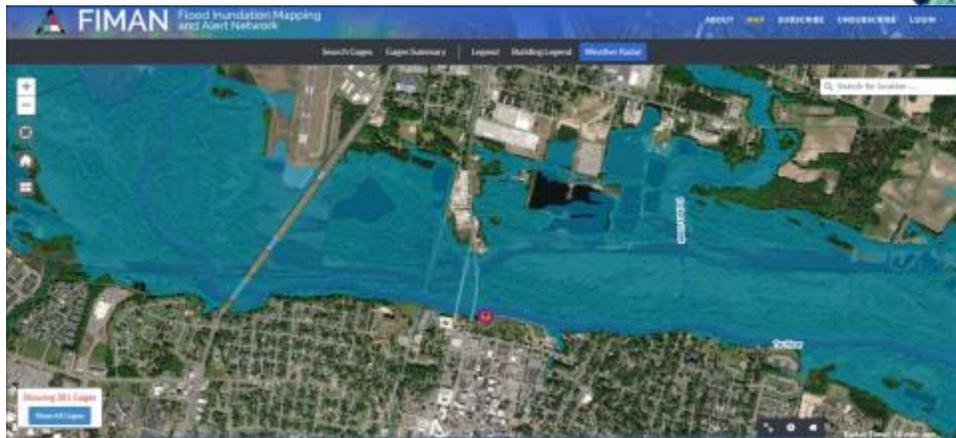


- **FLOOD HAZARD** – an event or physical condition that can cause fatalities, injuries, property damage, infrastructure damage, agricultural loss, damage to the environment, interruption of business, or other types of harm or loss.
- **FLOOD IMPACT** – measurable damage resulting from a flood hazard event on people and social, environmental, structural, commercial and infrastructure assets.
- **FLOOD RESILIENCE** – capacity of individuals, a community, business, or natural environment to prevent, withstand, respond to, and recover from a flood event.
- **FLOOD RISK** – the likelihood a flood event will harm individuals, communities, or assets with some severity or consequence.
- **FLOOD VULNERABILITY** – measure of someone and something's (infrastructure, economic activity) ability to prepare for, manage, survive, and recover from a flood event.

Current & Future Flood Hazards

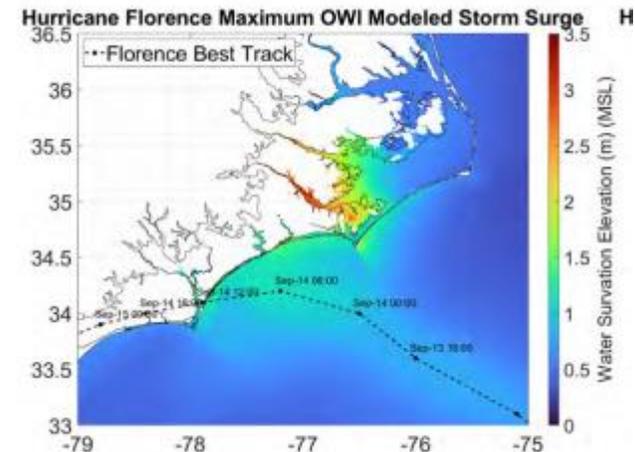


Riverine and stormwater flooding



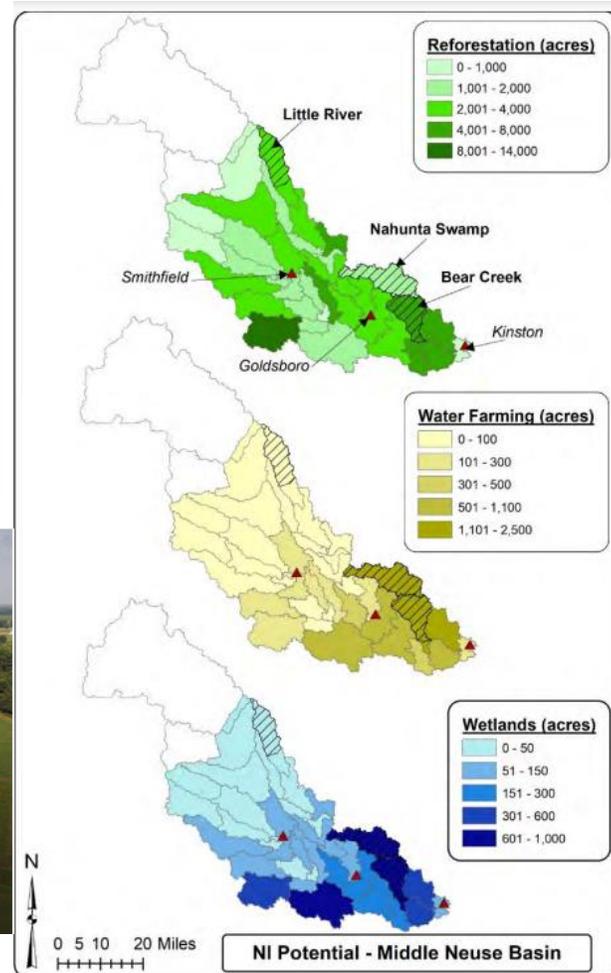
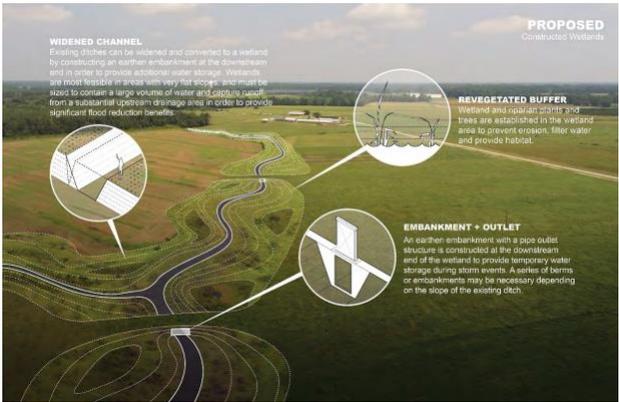
Source: Flood Inundation Mapping and Alert Network (FIMAN)

Coastal storm surge and tidal

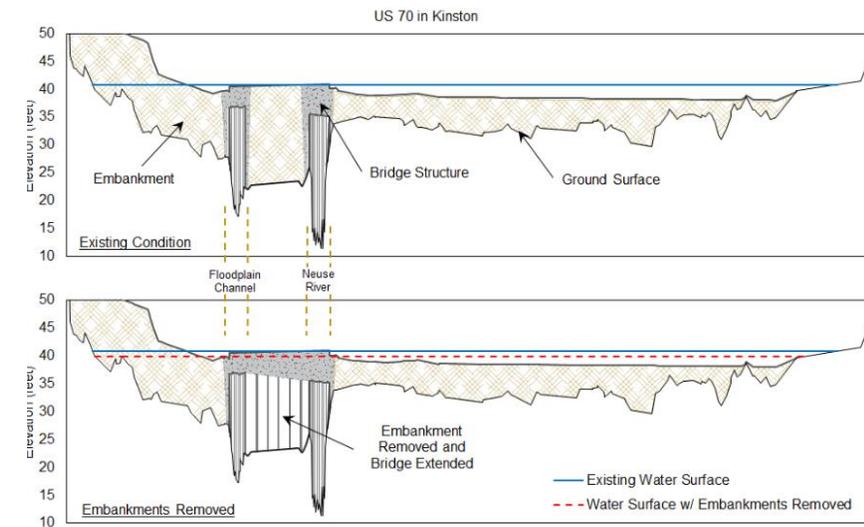


Source: Natural Systems: [Compound Flooding](#), NC Policy Collaboratory, 2021

Mitigation Scenarios



Source: Infrastructure: Enhancing Stormwater Controls, NC Policy Collaboratory, 2021.



Source: Bridge Crossing Modeling Study – Kinston, NC Sea Grant

Source: [Improving North Carolina's Resilience to Coastal Riverine Flooding](#), NC Policy Collaboratory, 2021.

Stormwater Flooding, Morehead City



Source: [Coastal review.org](http://Coastalreview.org)

Agriculture



Source: French Broad Basin, Pigeon River
[The Mountaineer](#)



Source: Hyde County, [NCSU](#)

Critical Infrastructure



Source: News and Observer, I-40, 9/30/19

Energy



Source: [Duke Energy](#)

Hurricane Florence, Compound Flooding, New Bern



Source: [NBC News](#)

Decisions Now & Strategic Future

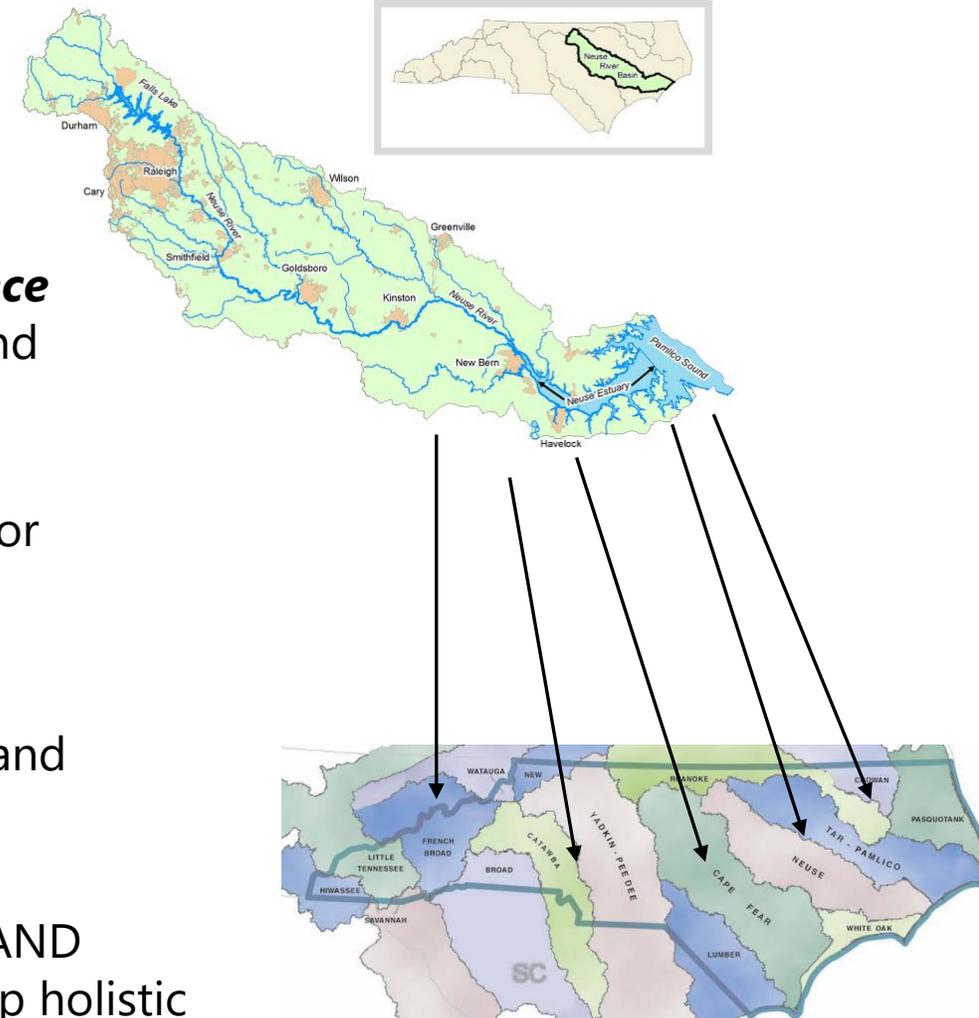


Statewide

- Visualize flood vulnerability for different flood risk conditions (dependent on data/models available)
- Choose from a suite of flood mitigation strategies
- Understand cost estimates, funding sources, costs/benefits
- Recommendations for **long-term administration and maintenance** of the Blueprint (such as updating key data and modeling inputs and long term basin planning)
- Recommendations for **governance and decision making** (who evaluates and approves flood mitigation projects or priority areas for additional modeling/data needs)

Basin-specific action strategies

- Taking into account NC basins have different flood exposure, data and modeling needs, capacity and/or values; unique stakeholders and governments for each basin
- Identify best flood mitigation strategies given what we know now AND identify prioritized data and modeling needs in the basin to develop holistic basin strategy



Flood Resiliency Blueprint Tentative Timeline



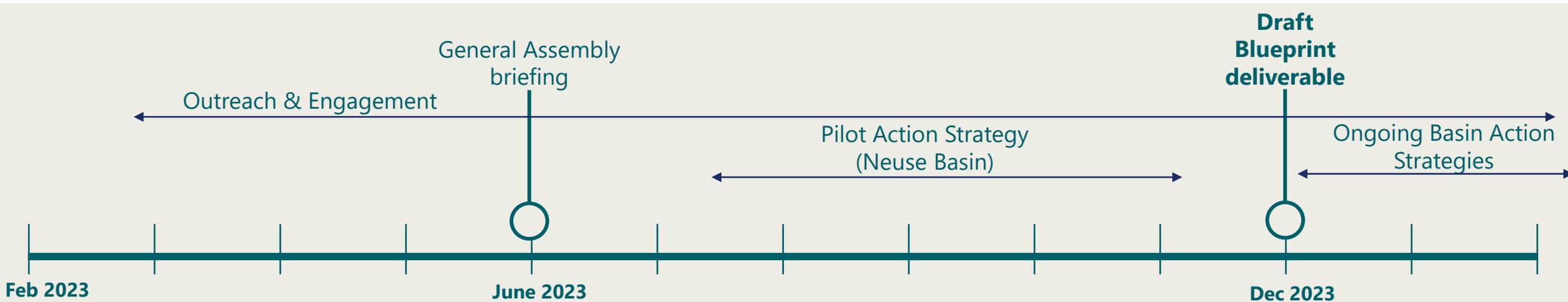
2022 Outputs: Outreach and engagement to develop scope of work; awarded Phase I contract

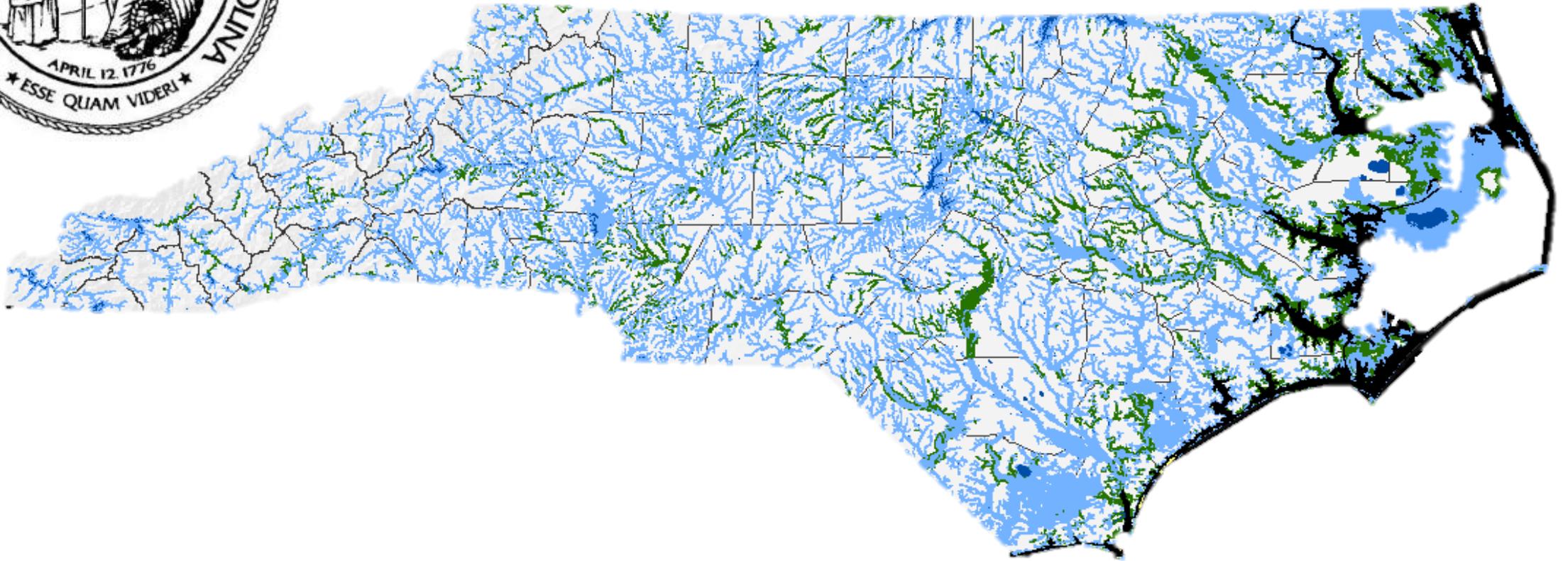
2023 Outputs:

- Requirements for online decision support tool
- Draft NC Flood Resiliency Blueprint
- Draft Neuse Basin Action Strategy and beta-testing tool

2024: Statewide validation and testing of the online tool in NC basins and development of basin-specific action strategies

2025+: Ongoing maintenance, administration, updates, etc.







Phase I Overview

Andy Hadsell, Project Manager, AECOM





- Key**
- ESP Associates, Inc.
 - Wildlands Engineering, Inc.
 - Elite Disaster Consulting
 - North Carolina State University
 - Geomatics Workshops
 - Insight Planning & Development
 - Singhofen & Associates, Inc.

Project Principal
Mike Taylor, PE, CFM

Project Manager
Andrew Hadsell, PE

National Perspective Liaisons

Texas Coastal Resiliency Master Plan
Christopher Levitz, PE, CFM

Louisiana Watershed Initiative
Michael Donahue, PhD

South Carolina Floodplain Mapping Initiative
Daryle Fontenot, PE, CFM

Project Coordinator
Ashley Ervin, AICP

Quality Assurance/Control (QA/QC)

Program Lead
Susan Phelps, GISP, CFM

Document/Data Management

Program Lead
Judie Taylor

Task 1: Stakeholder Outreach/Facilitation

Task Lead
Hope Morgan, NCPLS, GISP, CFM

Project Logistics Support
Sarah Pearcy

Event Facilitation
Kelly Keefe, CFM
Aaron Weieneth, AICP
Claire Still
● Ryan Cox, CFM

Task 2: Gap Analysis

Task Lead
Laura Arnold, PE, CFM

Literature Review
Noelle Slater

GIS Data & GAP Analysis
Kevin Nichols, GISP, CFM

North Carolina GIS Subject Matter Expert
Richard Fogleman, GISP, CFM

Hazard & Flood Modeling Support
Greg Rucker, PE
David Watson, PE, D.WRE
● Singhofen & Associates, Inc.

Futuristic Modeling/National Innovations
Andy Bonner, PE, CFM, PMP

IT/Tools
John Fisher, PE
● Libby Duggan

Desktop Analytics Post-Disaster (IT/Data Management)
Russell Repass

Task 3: Recommendations/Decision Framework

Task Lead
● David Key, PE, CFM

Flood Resiliency Support
● Barbara Doll, PhD, PE
Noelle Slater
Corey Diamond, CFM
● Elite Disaster Consulting

Evaluation of Risk/Detailed Modeling
● Matt Dudley, PE, CFM

Climate Resiliency & Risk Assessment
Shane Parson, PhD, PE, CFM
Erica Harris

Coastal Erosion
Cheryl Johnson, PE, CFM, PMP

Coastal Studies
Elena Drei-Horgan, PhD, CFM

Task 4: Develop Draft Blueprint and Pilot Action Strategy

Task Lead
Marcia Tobin, AICP

Project Development
Nathan Slaughter
John Dorman

Regulations, Policy & Cost Support
● John Hutton
● Jeff Keaton, PE
Doug Bellomo, PE, PMP
● Bill Tingle, PG, CFM
● Singhofen & Associates, Inc.
● Elite Disaster Consulting

Constructibility
David Watson, PE, D.WRE

Hazard-resistant Provisions of Building Codes and Standards
Laura Ghorbi, PE, CFM

Cost-Benefit Analysis
Jae Park, PhD, CFM

Expert System for Mitigation & Risk Scoring
● Matt Dudley, PE, CFM

Outreach and Engagement

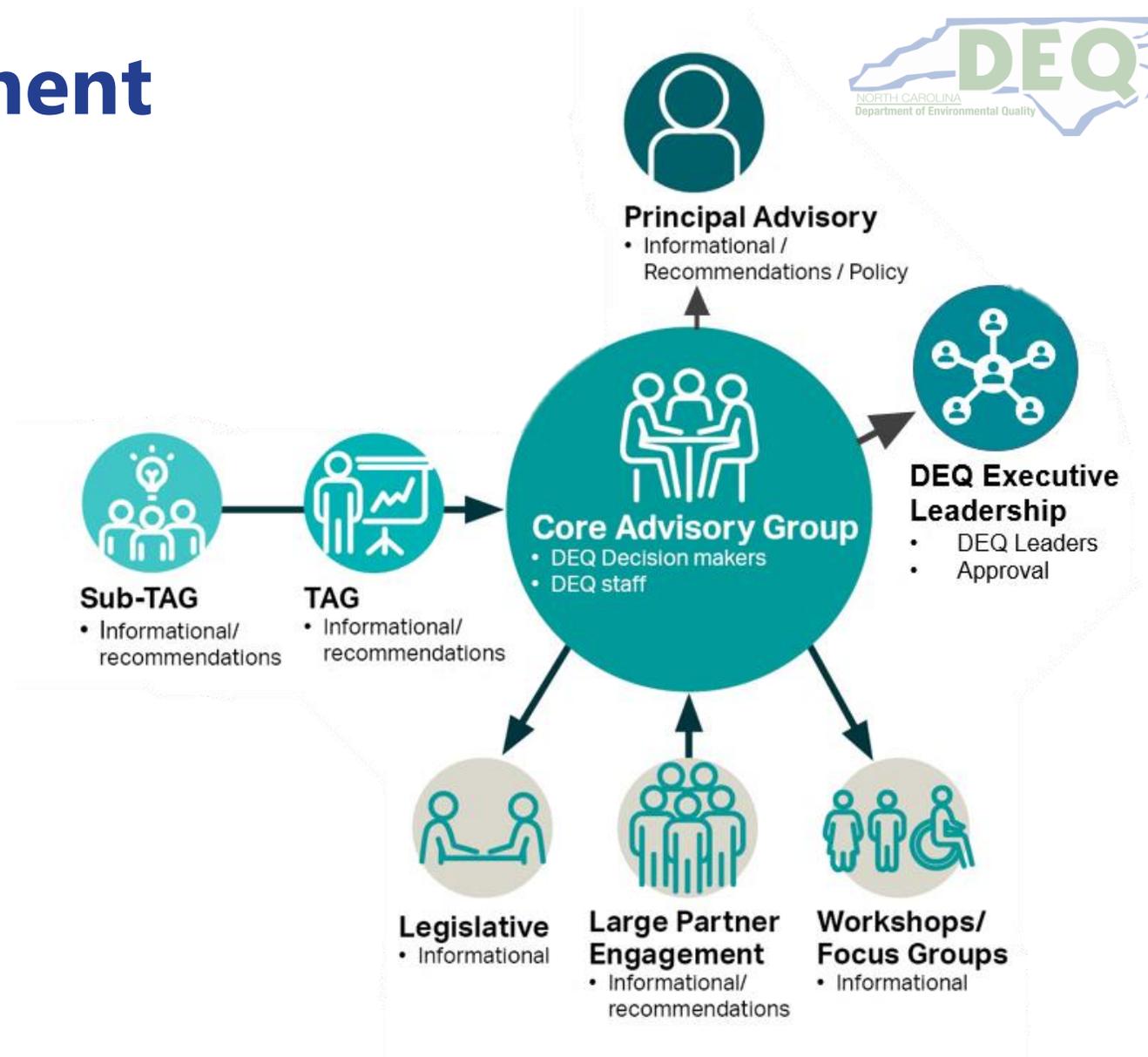


Creation of viable teams from extensive stakeholder list:
state, federal, local, and county experts,
Tribal, non-governmental organizations,
academic, and community experts

Stakeholder Engagement Plan (draft)/
Decision Making Process

Technical Advisory Group (TAG) can
create sub-TAGs for more detailed
requirements

- Coordinated meeting content and review

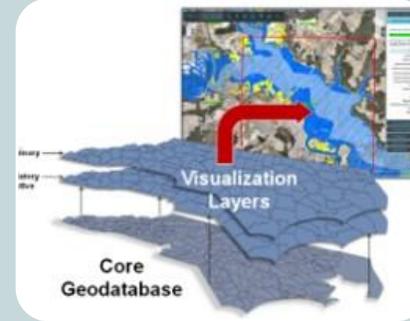
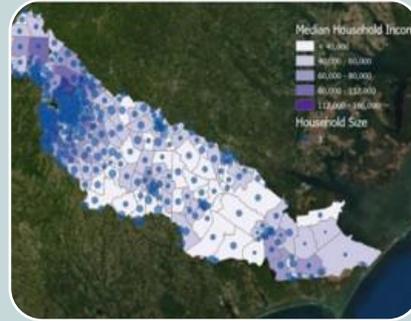
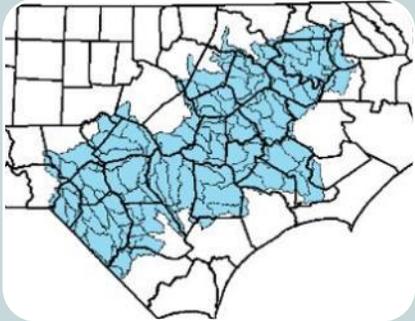


Data Collection Plan Classifications (“Profiles”)



Organizing datasets into profiles will help better identify and fill gaps for a more comprehensive Blueprint tool

Scalability



Basin Size & Population

- **17 River Basins**
- **Varying Topography**
- Population
- Culture
- **Adjacent States Headwater**

Hydrology and Hydraulics

- Model Type
- Model Age
- **Fluvial Conditions**
- **Pluvial Conditions**

Demographics, Diversity & Social Vulnerability

- **Diverse Populations**
- Equity
- Population 10M+
- 2.2M in Neuse Basin Alone

Source Data Quality/Coverage

- Data Rich Communities
- **Underserved Communities**
- **Allow for local Datasets**
- Proxy Datasets

Mitigation Techniques

- Flooding Source
- **Assessment of Alternatives**
- Policy and Law



Key Deliverables for Phase I

Product	Key Attributes
<p>1. Requirements needed to develop the suite of online decision support tools</p>	<ul style="list-style-type: none"> ▪ Storyboards to identify functions ▪ Description of how user will interface with the tool ▪ Mockups to depict look and feel of interactive tool
<p>2. Draft Neuse Basin Flood Resiliency Action Strategy (pilot)</p>	<ul style="list-style-type: none"> ▪ Findings and recommendations for improving flood resiliency ▪ Project descriptions, recommendations on entities best suited to implement ▪ Identification of further needs for data development or modeling
<p>3. Draft North Carolina Flood Resiliency Blueprint</p>	<ul style="list-style-type: none"> ▪ Manual for conducting flood resiliency planning at the river basin level ▪ How will these plans be developed going forward (e.g., long-term maintenance and administration of Blueprint)? ▪ Framework of key decision points, actions, and outcomes for each phase

Core Outcomes

These core outcomes are the focus for decision making:

1. Reduce likelihood and extent of flooding in NC
2. Reduce vulnerability and impact from flooding in NC
3. Increase community ability to maintain and quickly resume pre-storm activities following flooding in NC



Flood Resiliency Blueprint Document Management Site

<https://ncconnect.sharepoint.com/sites/FRBDM>

- SharePoint site will be used for review and commenting on deliverable documents for the NC Flood Resiliency Blueprint.
- Deliverable documents will be provided to the Technical Advisory Groups through the site's Documents library.

If you did not receive an invitation, or have any trouble accessing, please email judie.taylor@aecom.com



Flood Resiliency Blueprint Document Management

[Home](#)[General Information](#)[TAG Review Documents](#)[Documents](#)[Site contents](#)[Subtasks](#)[Recycle bin](#)

Welcome to the Flood Resiliency Blueprint Document Management System

This SharePoint site will be used for review and commenting on deliverable documents for the NC Flood Resiliency Blueprint.

All of the deliverable documents will be provided to the Technical Advisory Groups through the site's Documents library.

TAG Review Documents Shortcuts

[All TAG Review Documents](#)[TAG Review - Principal Advisory Group](#)[TAG Review - Governance](#)[TAG Review - Partnership/Funding](#)[TAG Review - Hazard Identification](#)[TAG Review - Vulnerability/Risk/Impact](#)[TAG Review - Resilience/Mitigation/Reduction](#)[TAG Review - Tool Development/Acceptance](#)[TAG Review - Neuse Regional Advisory Council](#)

Document Commenting Instructions

[Commenting on Word Files](#)[Commenting on Excel Files](#)



Principal Advisory Group Overview

Hope Morgan, Outreach/Facilitation Lead, AECOM



Principal Advisory Group

- Provide advisory input and feedback to the DEQ Core Team on the **policy, process, engagement, modeling, tools, and support utilized to implement the Blueprint**
- This group will need a **clear understanding of Blueprint's needs and how it will be integrated into further state prioritization** and floodplain management needs.

PAG Meetings

- March 22nd
 - Initial feedback from the TAGs
- July (Date TBD)
 - Policy and larger vision
 - End user/Persona input requirements review
 - Gap analysis understanding
- November 16th
 - Draft finals details
 - System Beta Test



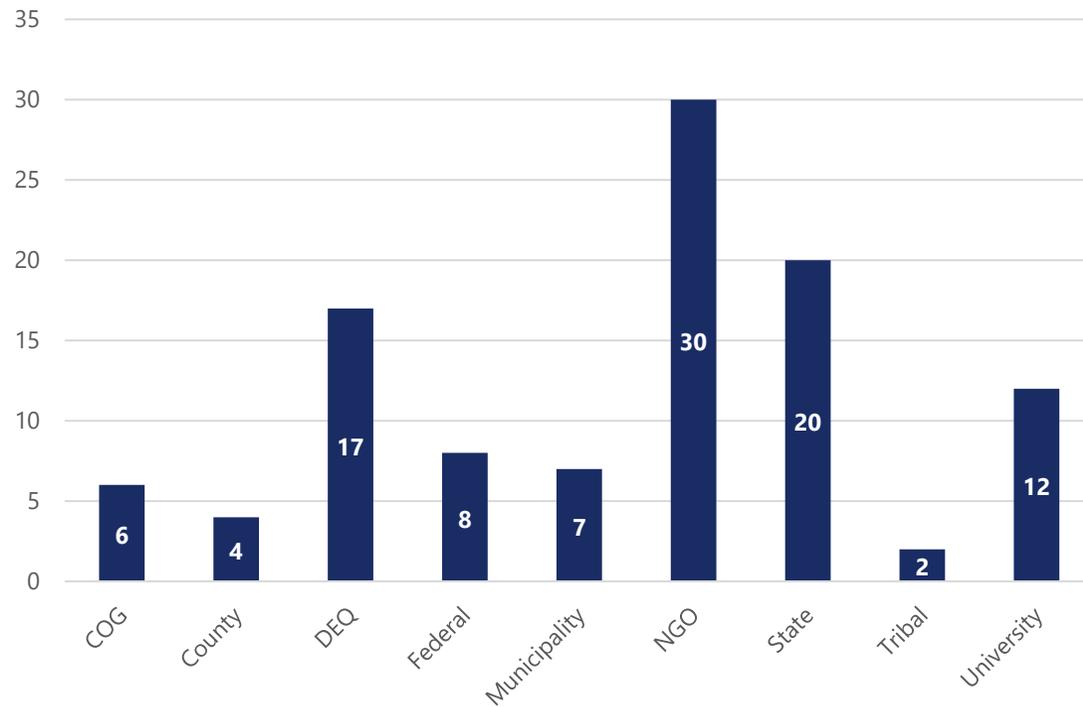
TAG Introductions and Kickoff Meeting Summary

Hope Morgan, Outreach/Facilitation Lead, AECOM



TAG Summary

Participants by Organization Type



- 106 Participants
- 7 TAGs
- 11-20 people per TAG
- Approximately 80 organizations

Technical Advisory Group Structures

Government		Environmental		Social		Neuse
Governance	Partnership/ Funding	Hazard Identification	Vulnerability/ Risk/Impact	Resilience/Mitigation/ Reduction	Tool Development/ Acceptance	Neuse Regional Advisory Group

Questions for the TAG Chairs - General Feedback

1. Were participants of your TAG engaged?
2. Did you note any feedback we need to address about TAG structure and review process?
3. Any significant feedback we need to consider about the NC Flood Resiliency Blueprint?
4. Are there any recommendations for additional members?

Governance TAG

- Provide advisory input and feedback on **existing and proposed regulations, policies, processes, and programs** at a federal, state, Tribal, historically marginalized community, and/or other local levels that will impact the rollout and sustainability of Blueprint
- TAG Chair: **Tancred Miller**, NCDEQ, Division of Coastal Management
- 17 participants

Government		Environmental		Social		Neuse
Governance	Partnership/ Funding	Hazard Identification	Vulnerability/ Risk/ Impact	Resilience/ Mitigation/ Reduction	Tool Development/ Acceptance	Neuse Regional Advisory Group

Partnership/Funding TAG

- Provide advisory input and feedback on the inventory of **funding and financial partnership opportunities** present or anticipated to support implementation of Blueprint projects.
- Provide input and feedback on criteria and modeling utilized to calculate benefit and prioritization.
- TAG Chair- **Robert Hiatt**, NC Association of Regional Councils of Government
- 11 participants

Government		Environmental		Social		Neuse
Governance	Partnership/ Funding	Hazard Identification	Vulnerability/ Risk/ Impact	Resilience/ Mitigation/ Reduction	Tool Development/ Acceptance	Neuse Regional Advisory Group

Hazard Identification TAG

- Provide advisory input and feedback on data and modeling utilized to best calculate and display **present and future flood probability and extent.**
- Including consideration of deterministic and probabilistic riverine, lacustrine, dam and levee induced, urban, stormwater, and coastal and/or riverine confluence flooding.
- TAG Chair- **Tom Langan,** NC
Department of Public Safety,
Floodplain Mapping Program
- 12 participants

Government		Environmental		Social		Neuse
Governance	Partnership/ Funding	Hazard Identification	Vulnerability/ Risk/ Impact	Resilience/ Mitigation/ Reduction	Tool Development/ Acceptance	Neuse Regional Advisory Group

Vulnerability/Risk/Impact TAG

- Provide advisory input and feedback on data and modeling to best calculate and display **present and future vulnerabilities and impacts to people and receptors.**
 - People: population, historically marginalized communities, Tribes, etc.
 - Receptors: environment, agriculture, structures, infrastructure, commerce, etc.
- Provide input and feedback on criteria and modeling utilized for risk and equity ranking and rating.
- TAG Chair- **Kathie Dello**, NC State Climate Office
- 18 participants

Government		Environmental		Social		Neuse
Governance	Partnership/ Funding	Hazard Identification	Vulnerability/ Risk/ Impact	Resilience/ Mitigation/ Reduction	Tool Development/ Acceptance	Neuse Regional Advisory Group

Resilience/Mitigation/Reduction TAG

- Provide advisory input and feedback on data and modeling to best calculate and display **present and future loss avoidance to people and receptors**
 - People: population, historically marginalized communities, Tribes, etc.
 - Receptors: environment, agriculture, structures, infrastructure, commerce, etc.
- Provide input and feedback on criteria and modeling utilized for ranking and prioritizing mitigation strategies and projects.
- TAG Chair- **Marlena Byrne**, NC Department of Public Safety, Office of Recovery and Resiliency
- 20 participants

Government		Environmental		Social		Neuse
Governance	Partnership/ Funding	Hazard Identification	Vulnerability/ Risk/ Impact	Resilience/ Mitigation/ Reduction	Tool Development/ Acceptance	Neuse Regional Advisory Group

Tool Development/ Acceptance TAG

- Provide advisory input and feedback on the **business case and functional requirements of Blueprint tools, websites, and applications** to ensure efficient engagement and decision making
- Focus on the usability of tools for end users incorporating a weighted understanding of people and receptors
 - People: population, historically marginalized communities, Tribes, etc.
 - Receptors: environment, agriculture, structures, infrastructure, commerce, etc.
- TAG Chair- **Colleen Kiley**, NC Department of Information Technology
- 12 participants

Government		Environmental		Social		Neuse
Governance	Partnership/ Funding	Hazard Identification	Vulnerability/ Risk/ Impact	Resilience/ Mitigation/ Reduction	Tool Development/ Acceptance	Neuse Regional Advisory Group

Neuse Regional Advisory Group

- Pilot river basin to implement and work through potential ideas for the Blueprint
- Provide input and feedback on **Neuse River Basin specific needs** and how to engage and utilize the information from the Blueprint at a river basin level most effectively and efficiently
- This group should be representative of the basin and is intended to serve as a pilot that will help define how future basins are incorporated into the Blueprint process.
- TAG Chair- **Jordan Hughes**, City of New Bern
- 16 participants

Government		Environmental		Social		Neuse
Governance	Partnership/ Funding	Hazard Identification	Vulnerability/ Risk/ Impact	Resilience/ Mitigation/ Reduction	Tool Development/ Acceptance	Neuse Regional Advisory Group

Survey Results



Menti Questions

- What do you think of when you hear “NC Flood Resiliency Blueprint”?
- What would you prioritize as the most important actions to help with flood resilience?
- What is the first thing the state specifically should do that would advance flood resilience?
- Are there people you would recommend to serve on this TAG?

Following slides provide examples but are not comprehensive.

What would you prioritize as the most important actions to help with flood resilience?



Actual implementation dollars, guidance, and support from grantors/grantee to ensure implementation is as easy and quick as possible

Having enough capacity at the local level to maintain measures/systems

Consolidated and actionable data that leads to implementation of projects

Adequate funding and legislative commitment long term

Including a broad diversity of stakeholders providing early input

Utilize natural infrastructure to mitigate flood damage

What is the first thing the state specifically should do that would advance flood resilience?



Have reasonable expectations for implementation of construction projects

Increase funding to implement known actions/projects in documented plans

Provide funding and training for local governments to implement strategies

Address ongoing practices that are raising flood risks

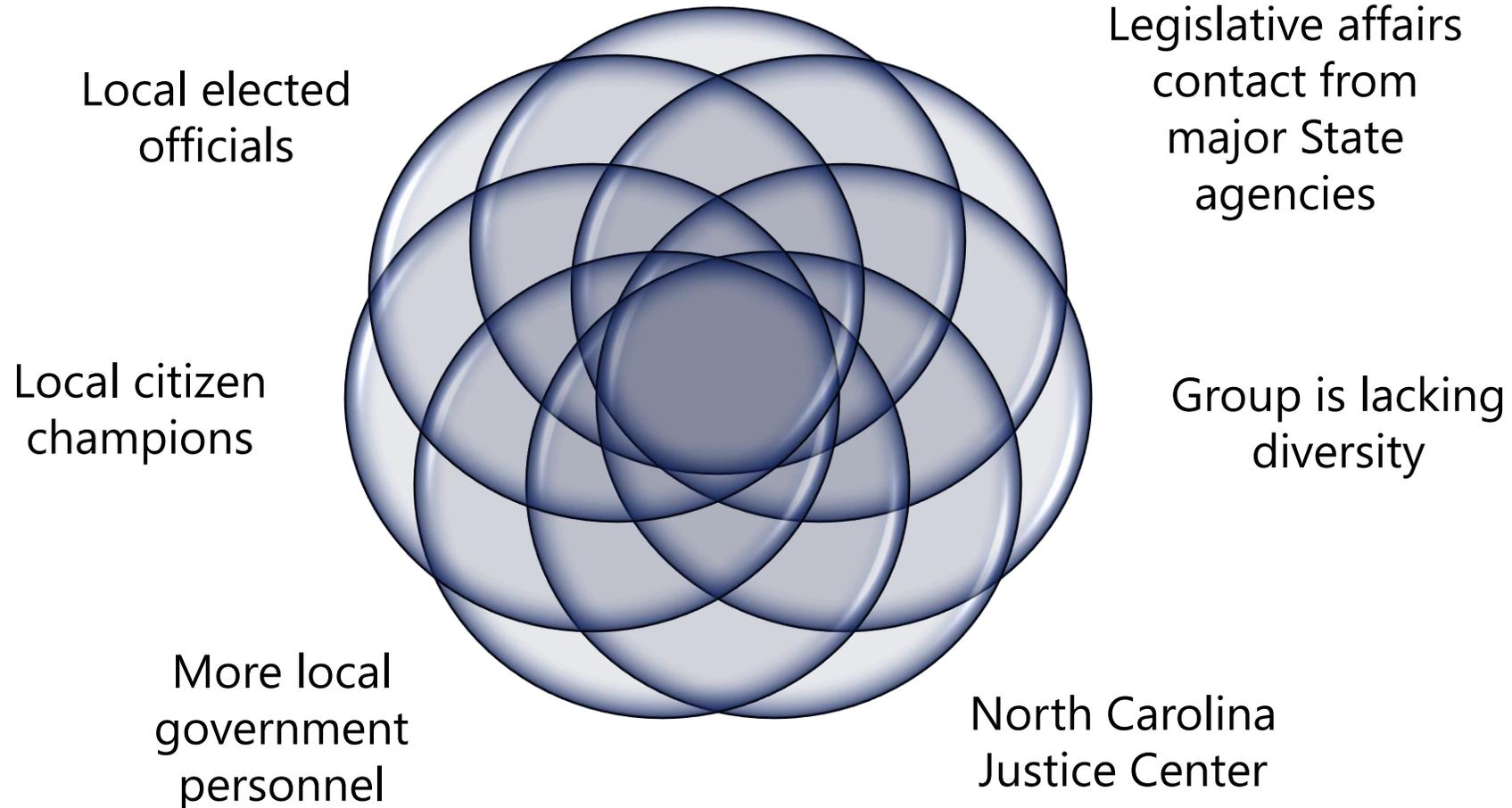
Educate elected officials on the importance

Determine a statewide and local governance structure which can support watershed based flood control

Understand how hydrology will change by future land use decisions

Are there people you would recommend to serve on this TAG?

VOAD Leaders





Open Discussion

