North Carolina Flood Resiliency Blueprint

NC Geographic Information Coordinating Council

Raleigh, NC

May 17, 2023

NORTH CAROLINA
Department of Environmental Quality

DEQ Program Overview

Elizabeth Christenson

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


MAY 20th 1775
N C
APRIL 12th 1776

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.

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Visualize Flood Risk

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Visualize Flood Risk Select Mitigation Alternatives

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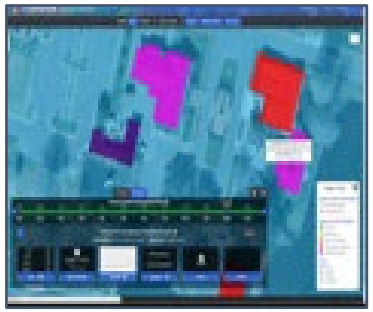
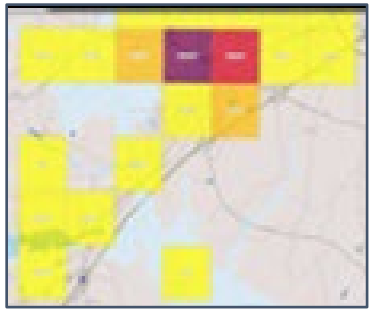
Visualize Flood Risk

Select Mitigation Alternatives

Understand Impacts & Vulnerability

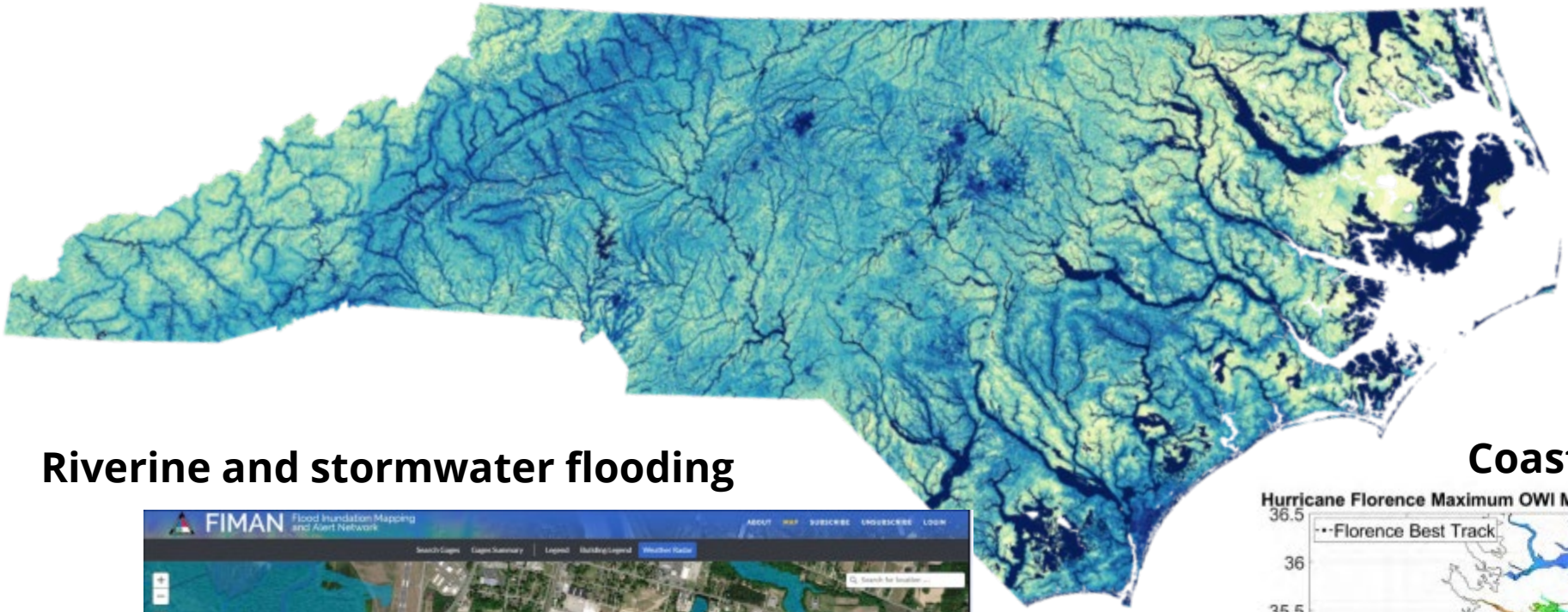




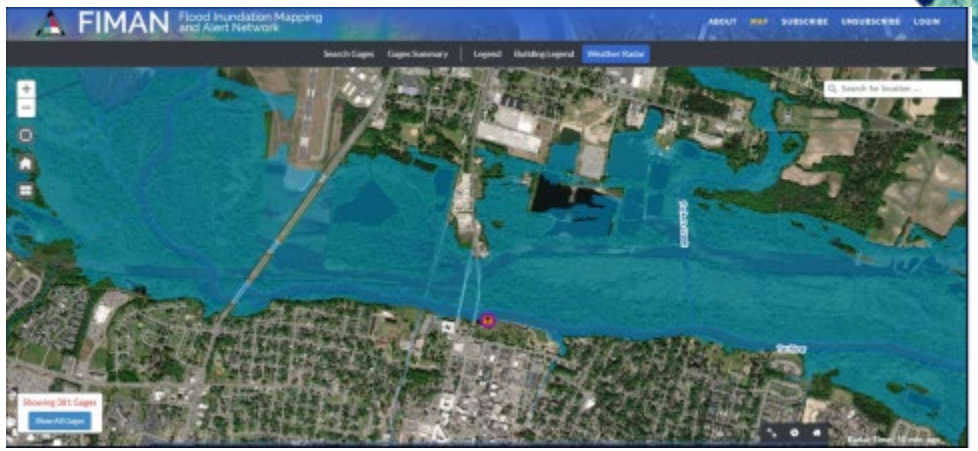
Definitions

- **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

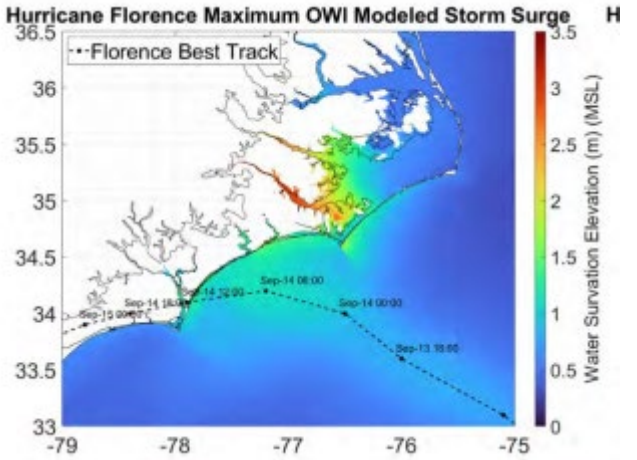


Riverine and stormwater flooding



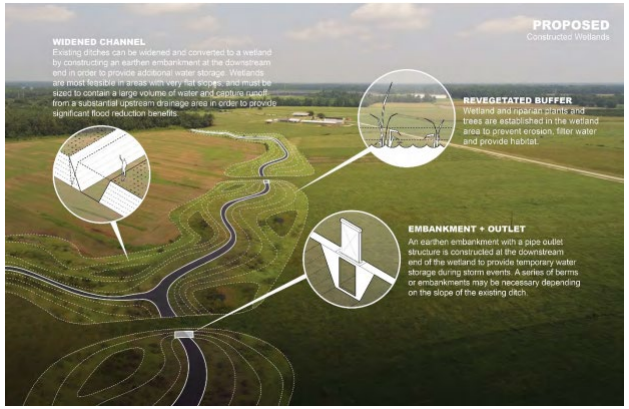
Source: Flood Inundation Mapping and Alert Network (FIMAN)

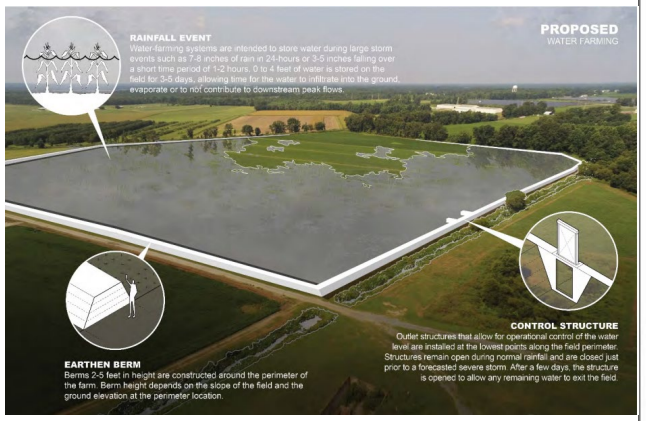
Coastal storm surge and tidal

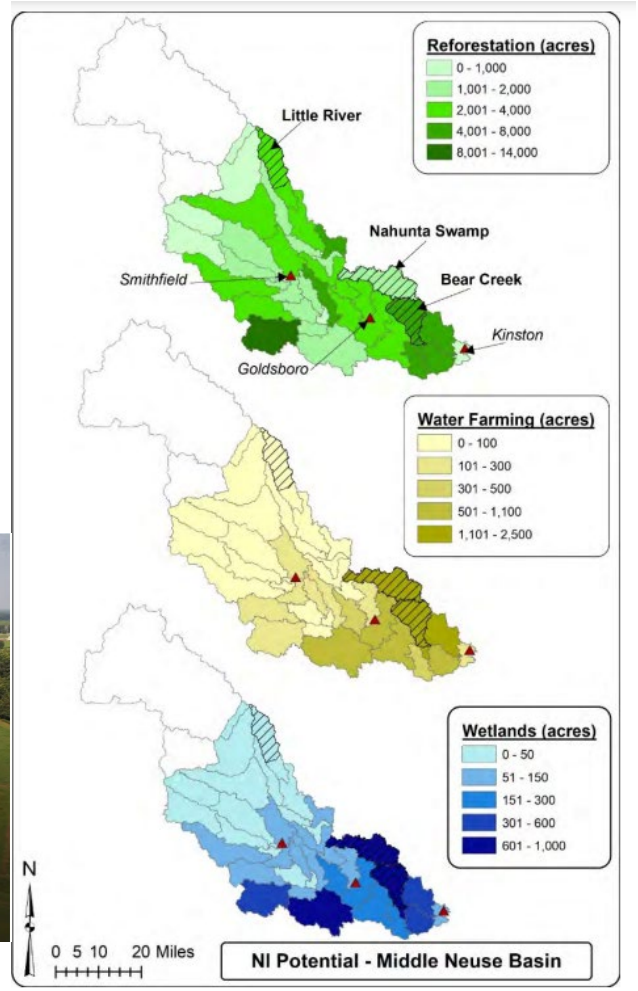


Source: Natural Systems: Compound Flooding, NC Policy Collaboratory, 2021

Mitigation Scenarios

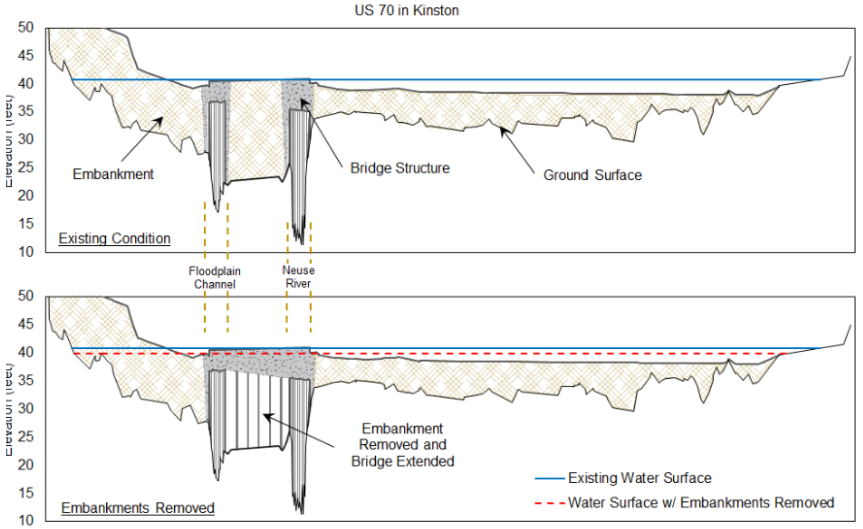






Source: [Improving North Carolina's Resilience to Coastal Riverine Flooding](), NC Policy Collaboratory, 2021.

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

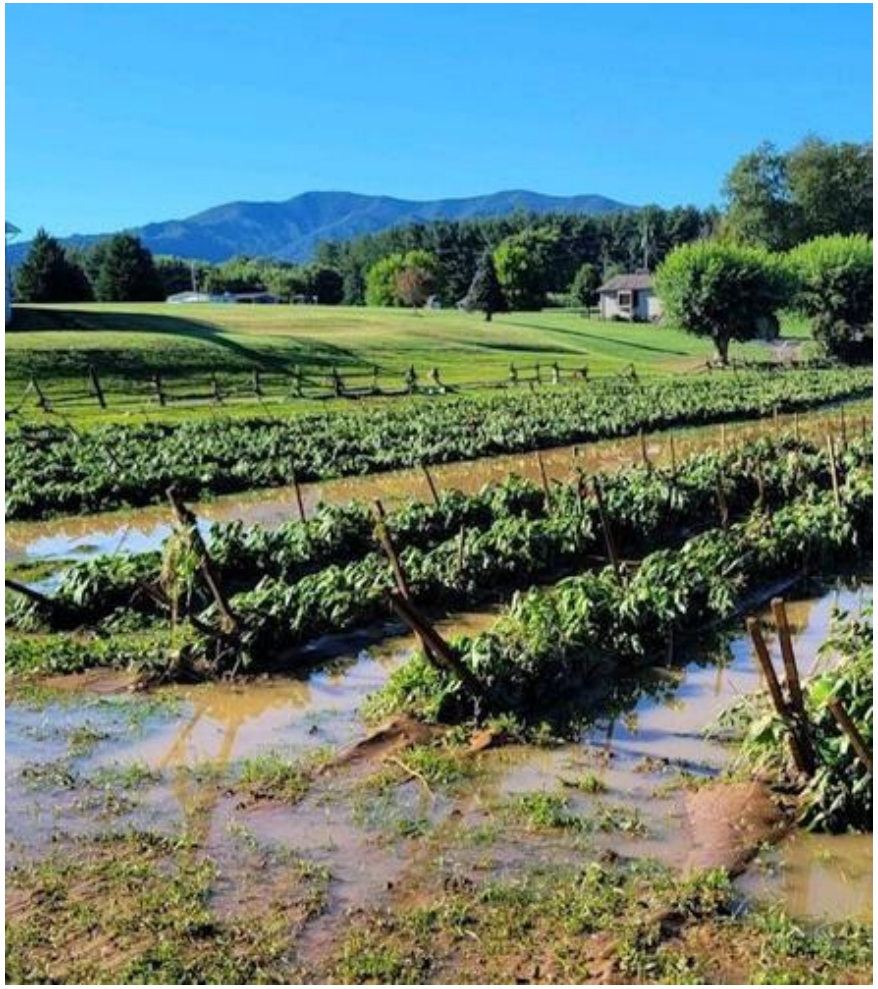


Source: Bridge Crossing Modeling Study – Kinston, [NC Sea Grant]()

Stormwater Flooding, Morehead City

Source: Coastal review.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

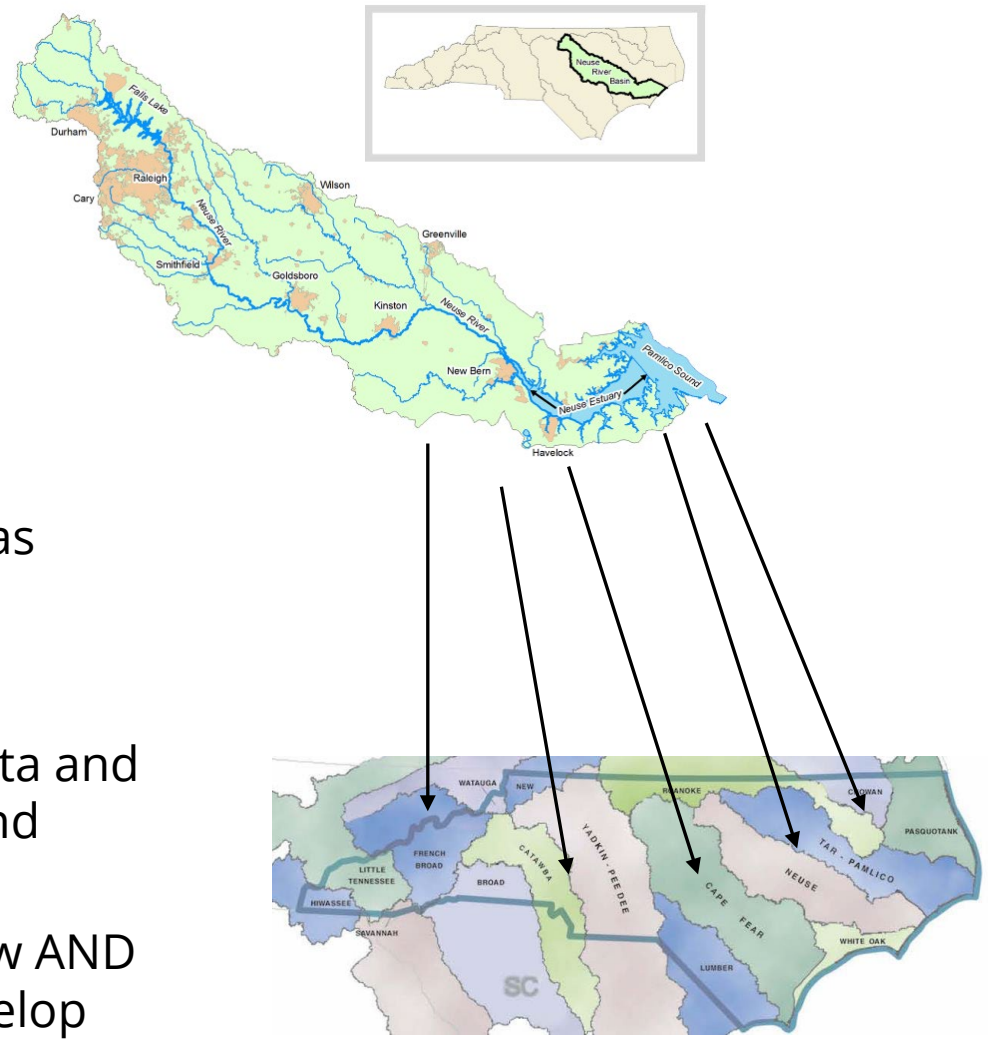
Hurricane Florence, Compound Flooding, New Bern

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

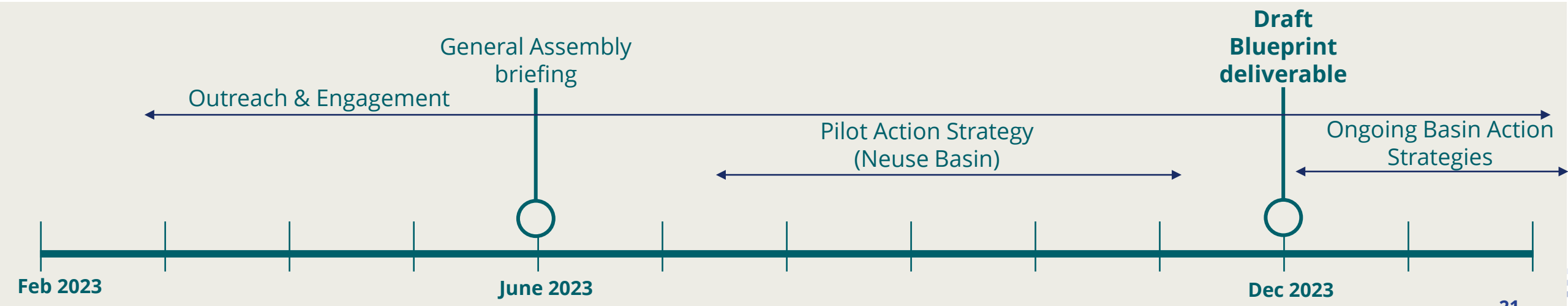
Flood Resiliency Blueprint Tentative Timeline

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.

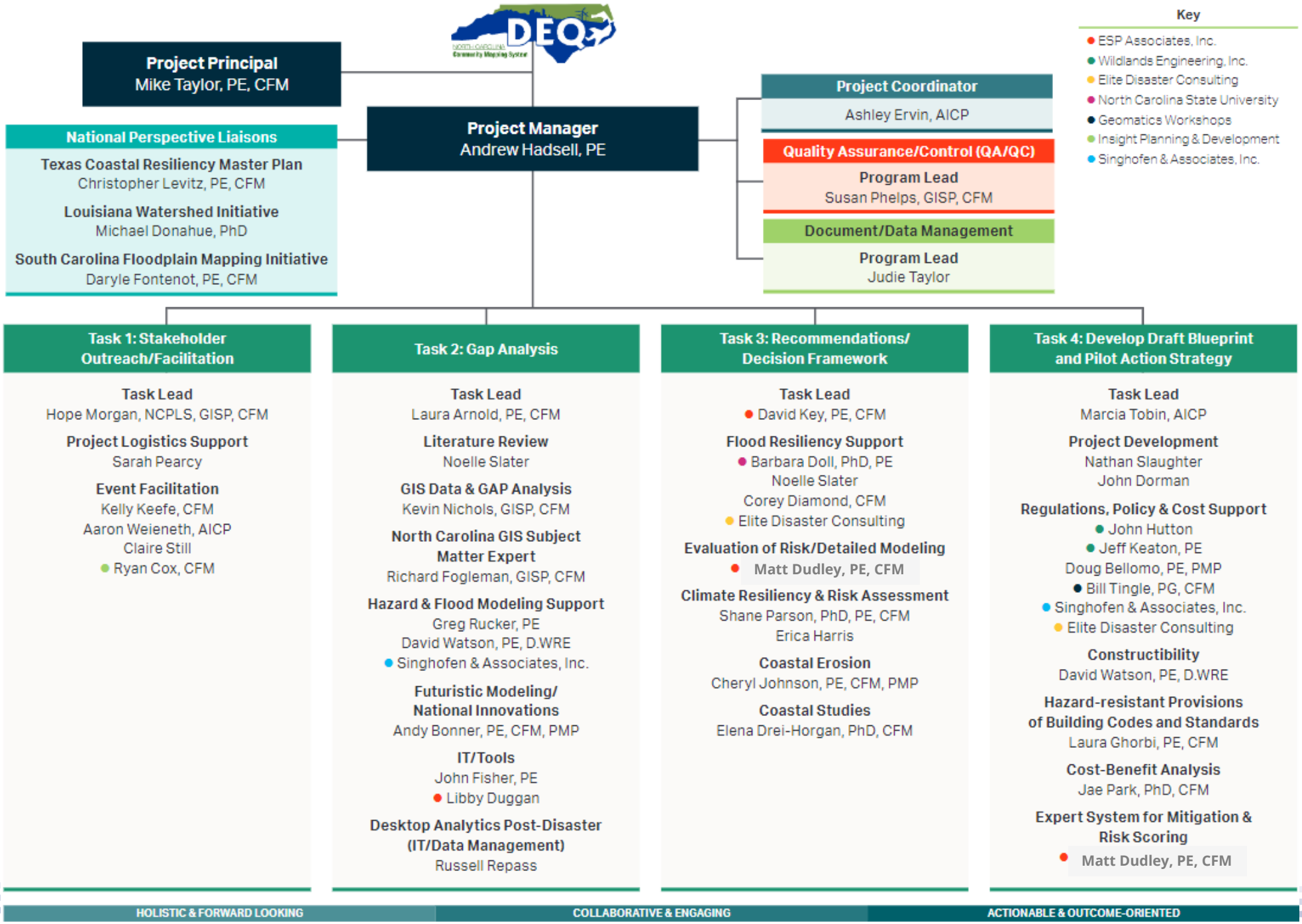


Key Deliverables for Phase I

Product	Key Attributes
1. Requirements needed to develop the suite of online decision support tools	▪ Storyboards to identify functions ▪ Description of how user will interface with the tool ▪ Mockups to depict look and feel of interactive tool
2. Draft Neuse Basin Flood Resiliency Action Strategy (pilot)	▪ 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
3. Draft North Carolina Flood Resiliency Blueprint	▪ 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

Phase I Overview

Andy Hadsell, Project Manager, AECOM


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
Key
ESP Associates, Inc.
Wildlands Engineering, Inc.
Elite Disaster Consulting
North Carolina State University
Geomatics Workshops
Insight Planning & Development
Singhofen & Associates, Inc.
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
HOLISTIC & FORWARD LOOKING
COLLABORATIVE & ENGAGING
ACTIONABLE & OUTCOME-ORIENTED

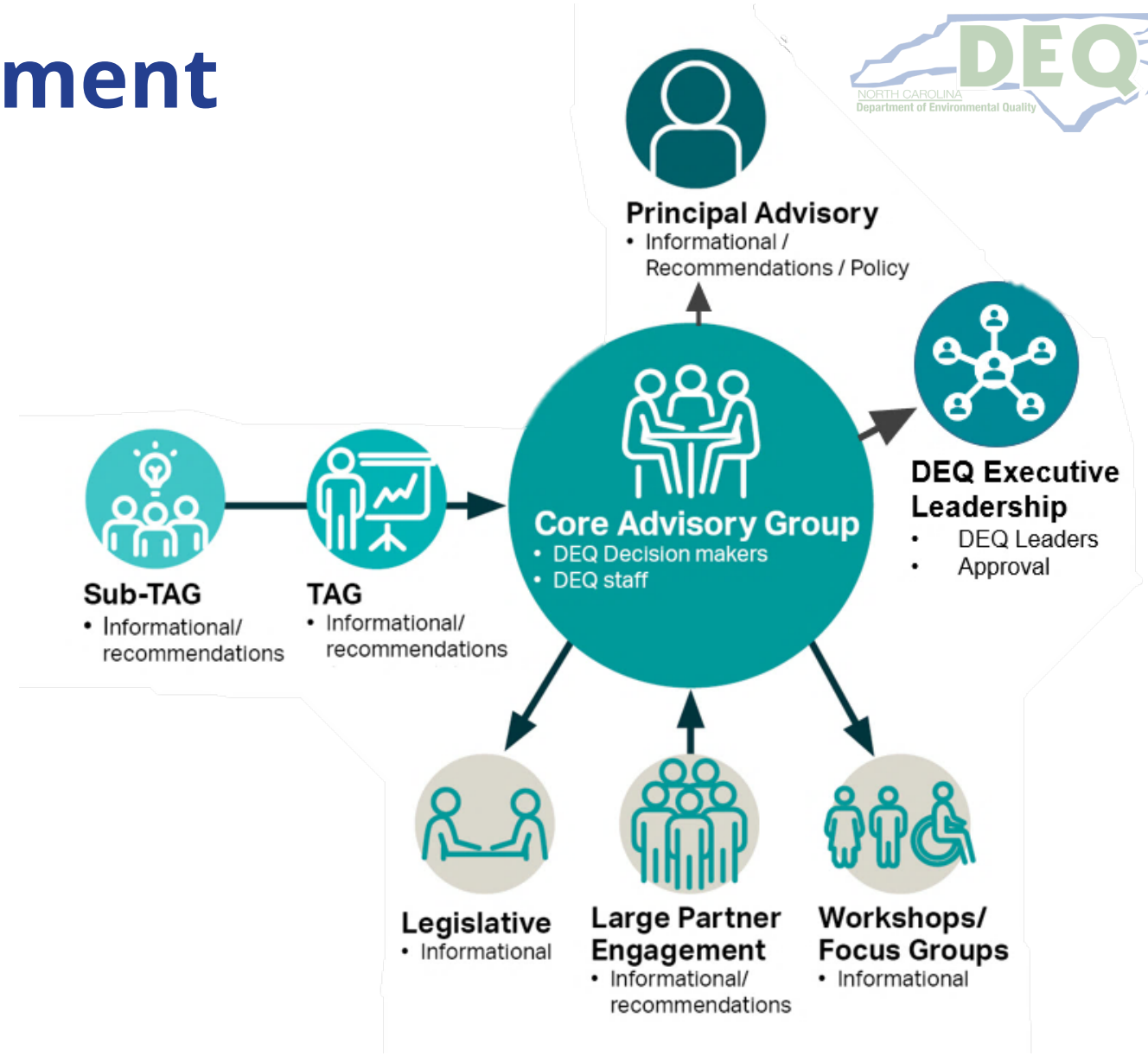
Outreach and Engagement

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

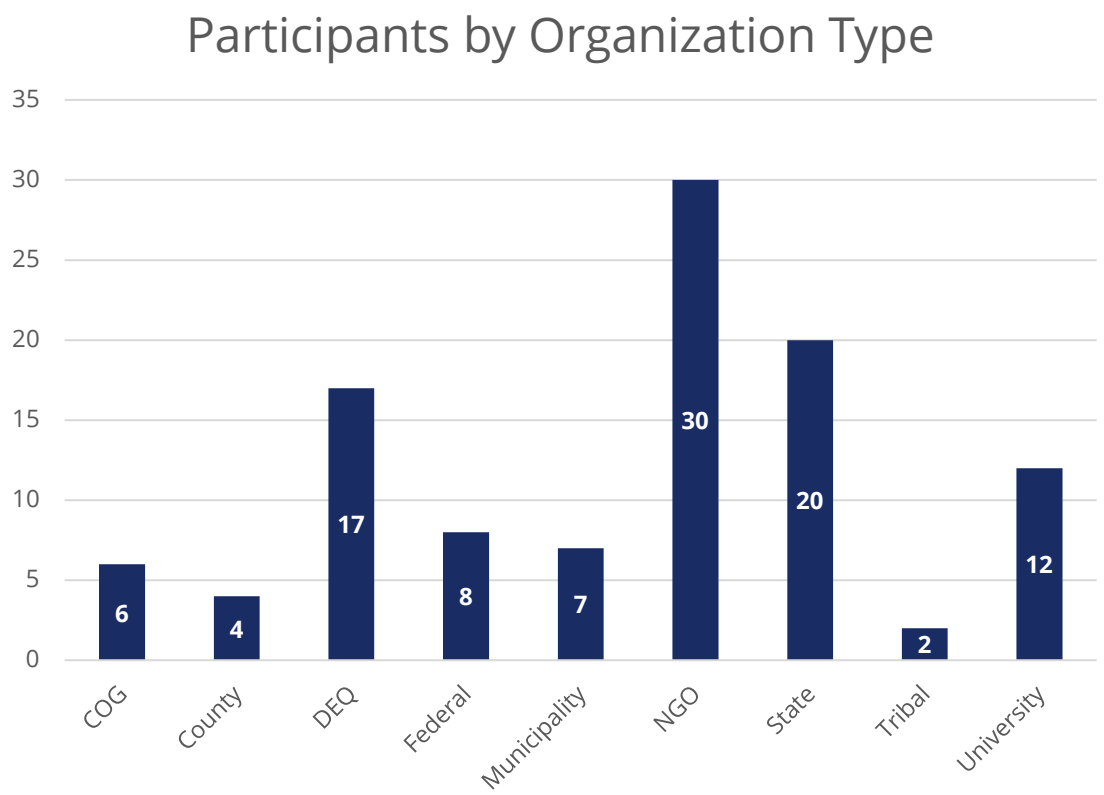


Technical Advisory Group Structures

Government		Environmental		Social		Neuse
Governance	**Partnership/ Funding**	**WHERE/WHEN:** Hazard Identification	**WHO/WHAT:** Vulnerability/ Risk/Impact	**HOW:** Resilience/Mitigation/Reduction	**Tool Development/ Acceptance**	**Neuse Regional Advisory Group**

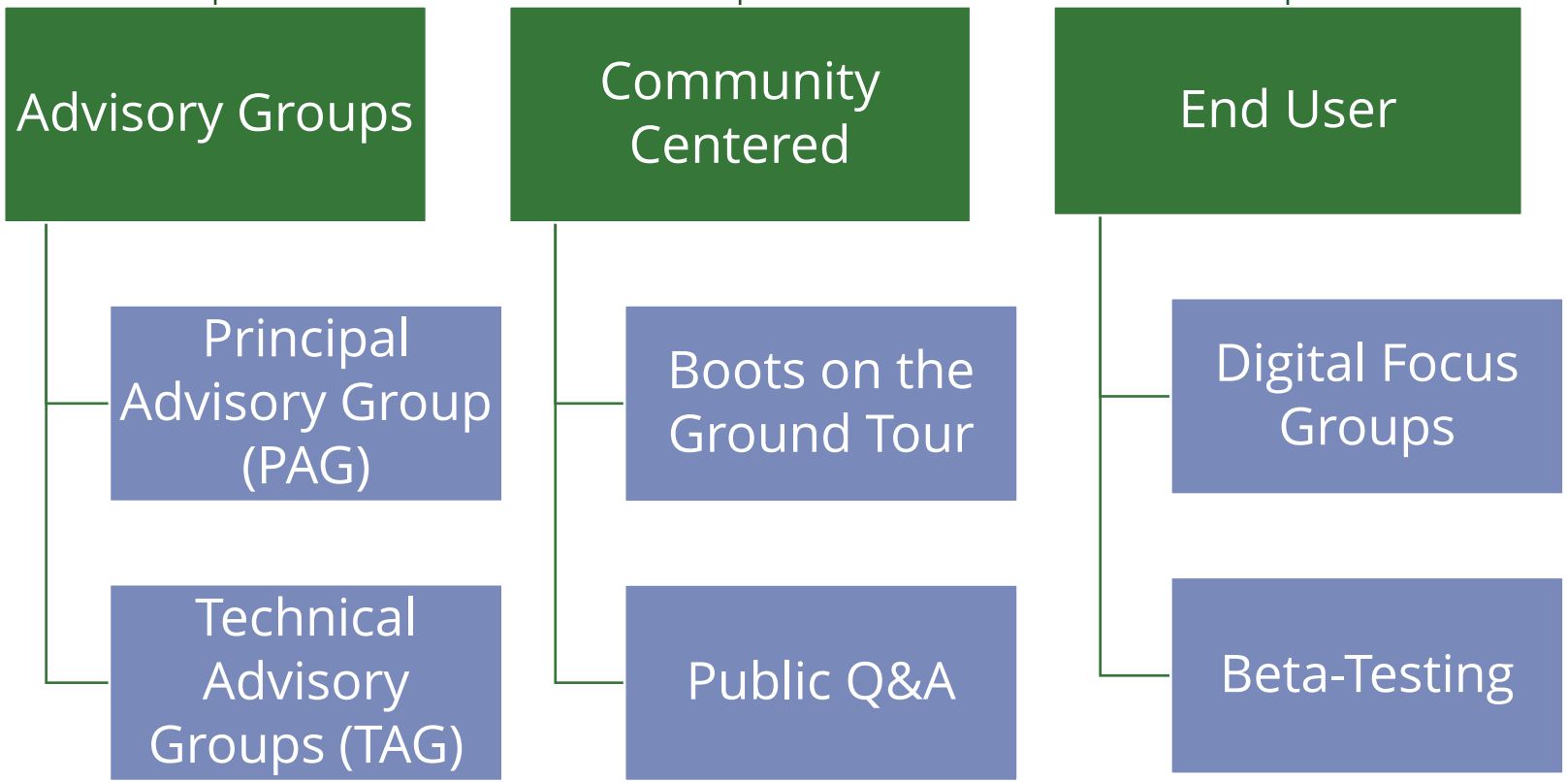
- Subject matter experts
- Review Blueprint deliverables
- Provide advisory input and feedback

Technical Advisory Group Kickoff March 15, 2023



- 106 initial participants
- 6 TAGs, 1 Regional Group
- 11-20 people per TAG
- Approximately 80 organizations

Stakeholder Engagement



DEQ Invited to Speak:

Pew

WESTERN NORTH CAROLINA RESILIENCE SYMPOSIUM

AMERICAN FLOOD COALITION ACTION

UNCW GLOBAL MARINE SCIENCE SUMMIT MAY 17-19, 2023

NC DEQ
SECRETARY'S ENVIRONMENTAL JUSTICE AND EQUITY ADVISORY BOARD

North Carolina Beach, Inlet and Waterway Association

NCDIT NORTH CAROLINA DEPARTMENT OF INFORMATION TECHNOLOGY

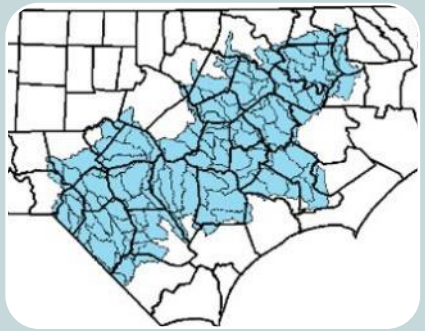
2023 NCGIS

N.C. Geographic Information Coordinating Council

Data Collection Plan Classifications ("Profiles")

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

Scalability

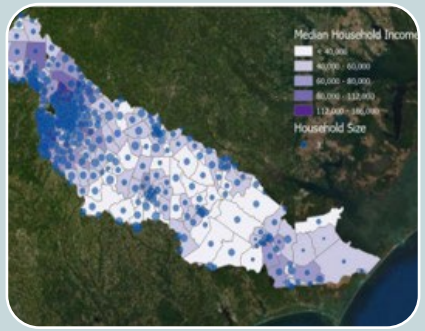


Basin Size & Population

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

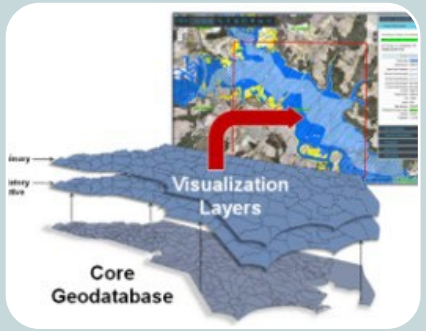
Hydrology and Hydraulics

- 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

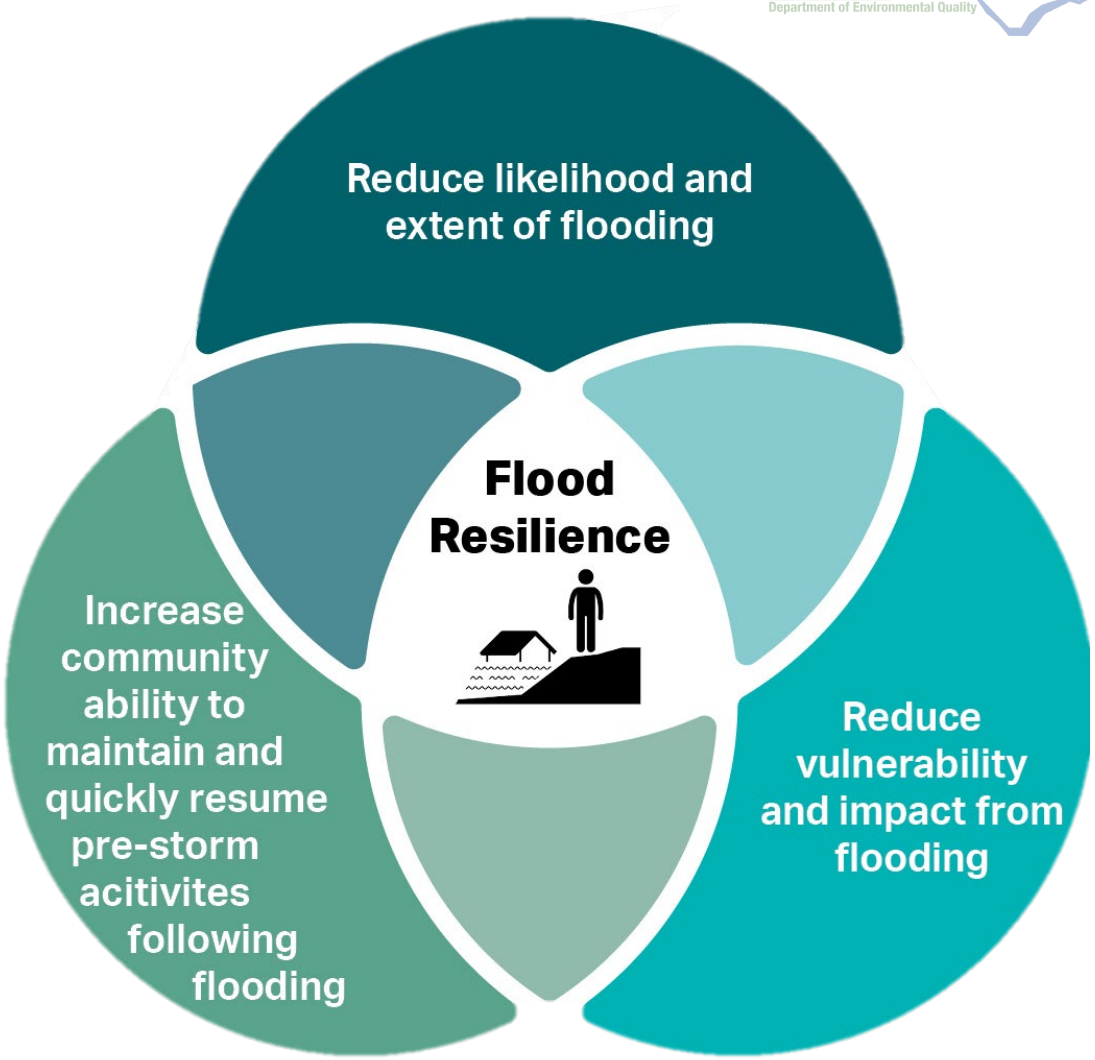
Mitigation Techniques

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

Core Outcomes

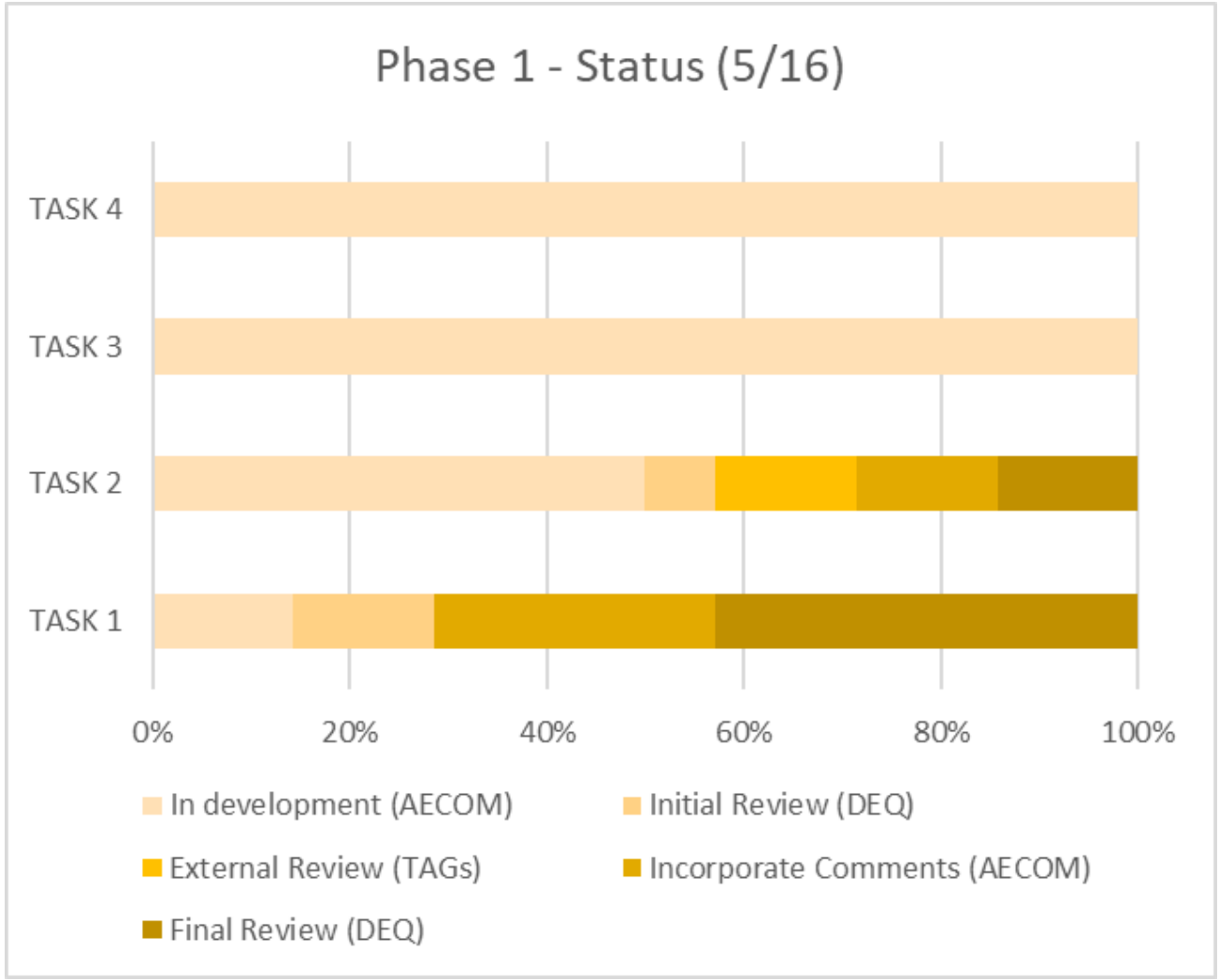
These core outcomes are the focus for decision making:

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



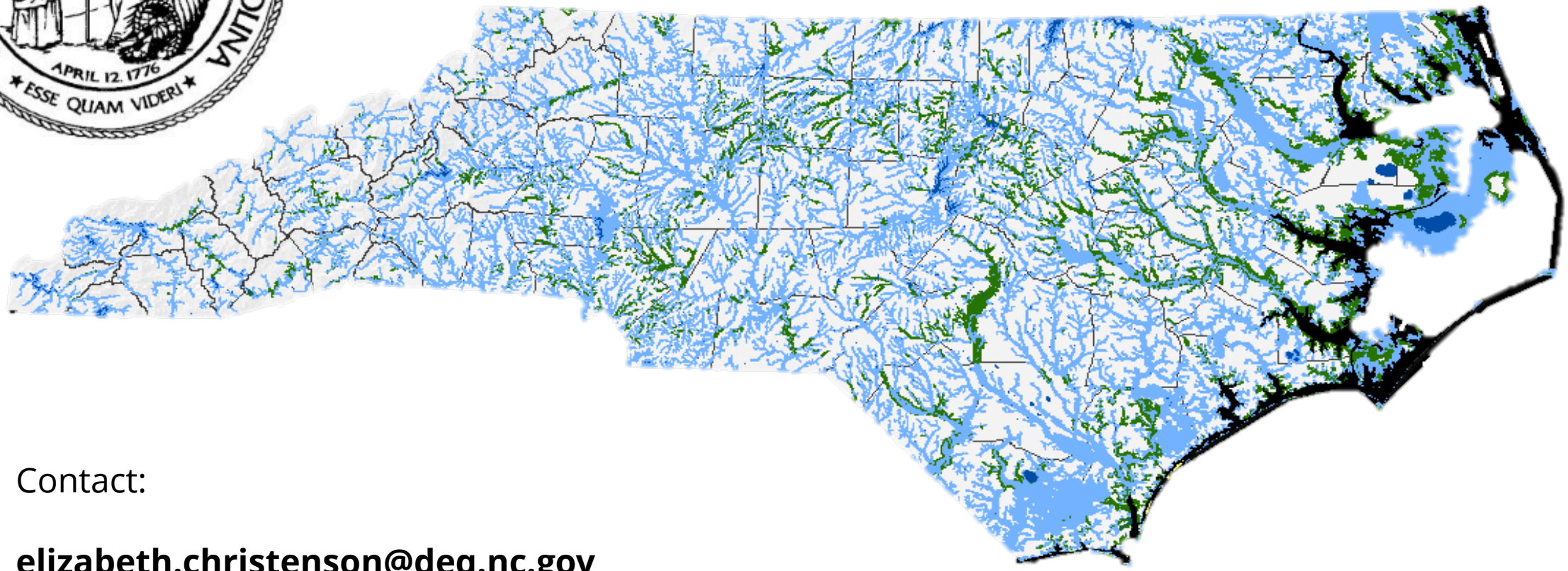
Deliverables (5/16/2023)

- Task 1: Stakeholder Outreach/Facilitation
  - **6 of 7 currently under review**
- Task 2: Gap Analysis
  - **7 of 14 currently under review**
- Task 3: Recommendations/Decision Framework
  - 16 deliverables (in develoment)
- Task 4: Draft Blueprint and Draft Pilot Action Strategy
  - 6 deliverables (in development)



Questions for GICC

- Neighboring States
- Future Conditions, other priority data updates?
- Strategic Plan?



Contact:

elizabeth.christenson@deq.nc.gov