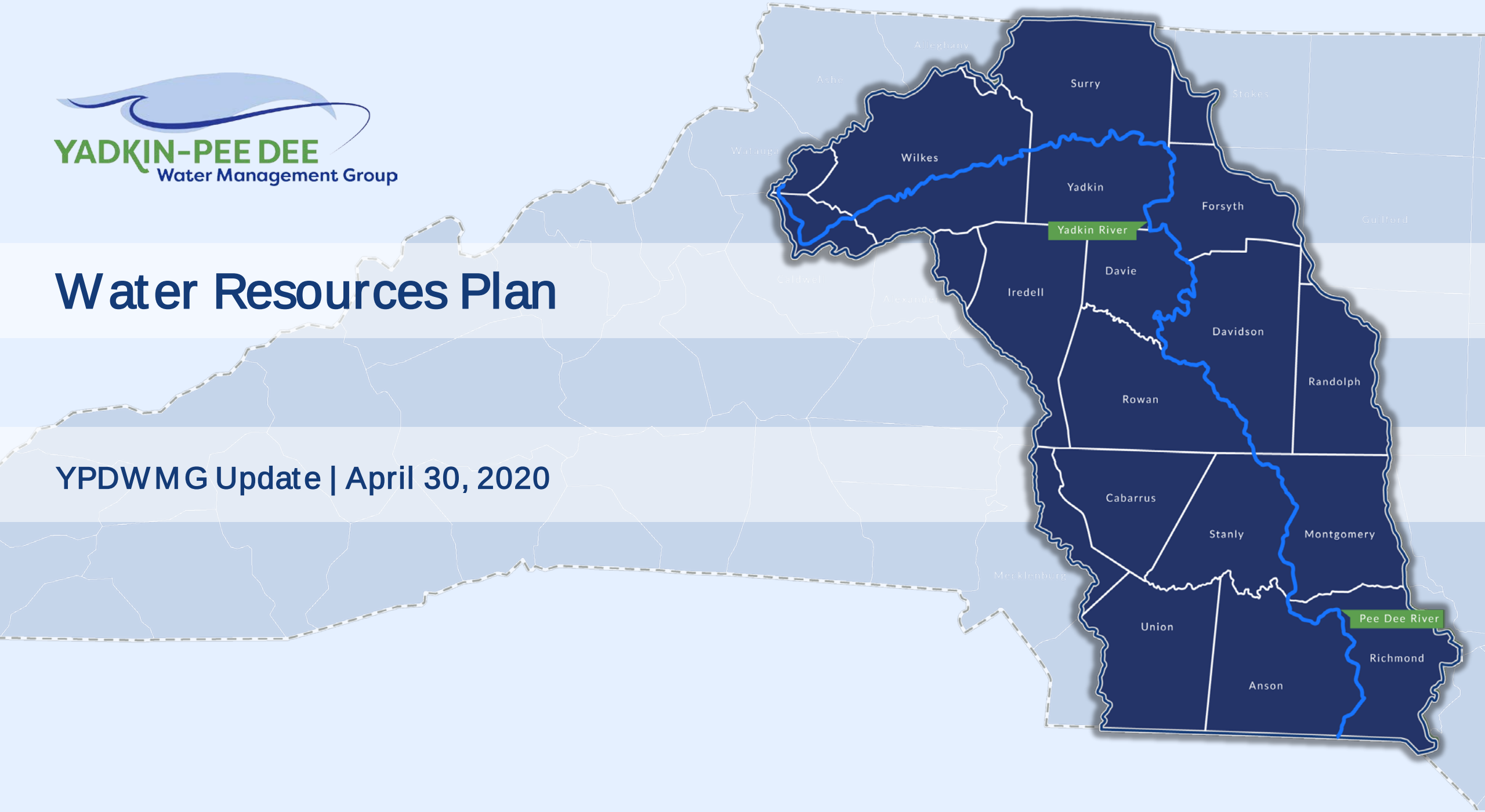
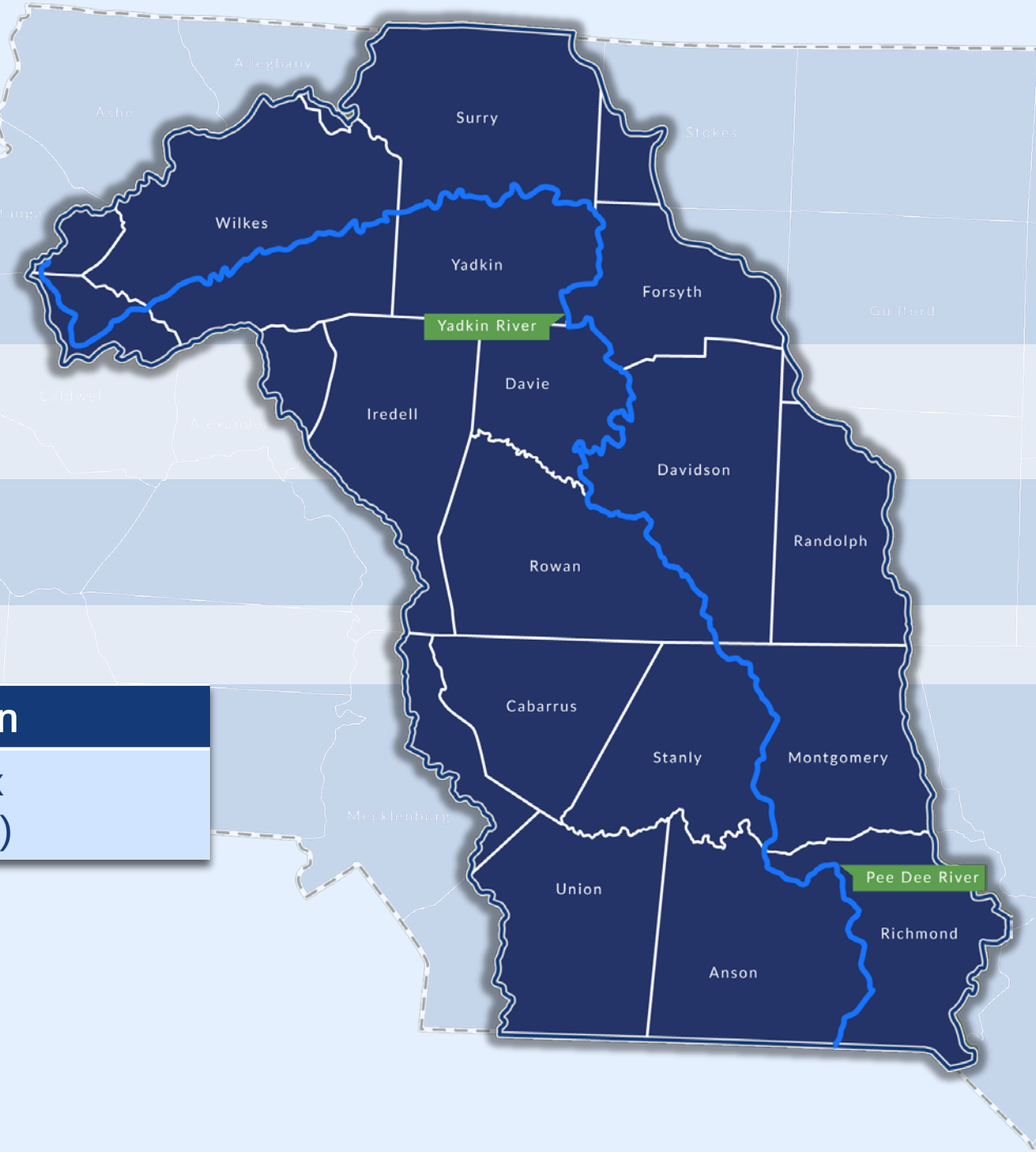
YADKIN-PEE DEE
Water Management Group

Water Resources Plan

YPDWMG Update | April 30, 2020



Stakeholder Advisory Committee



Inaugural meeting to be held:

Date/Time	Location
Friday, May 1 10 a.m. – 12 p.m.	Webex (Online)

Stakeholder Advisory Committee Members & Representatives

- North Carolina Farm Bureau Federation
  - Mitch Peele
- Centralina Council of Governments
  - Jason Wager
- Piedmont Triad Regional Council
  - Cameron Colvin
- Wilkes County Soil and Water Conservation District
  - Rob Baldwin
- Cabarrus Soil and Water Conservation District
  - Daniel McClellan
- NC Division of Water Resources
  - Linwood Peele
- U.S. Army Corps of Engineers
  - Tony Young
- UNC Chapel Hill School of Government
  - Shadi Eskaf
- NC Cooperative Extension
  - Amy-Lynn Albertson
- U.S. Geological Survey
  - Jerald "Boo" Robinson
- NC Department of Commerce (*Prosperity Zone Representative)*
  - Melanie Underwood
- NC Wildlife Resources Commission
  - Brian McRae
- Yadkin Riverkeeper
  - Brian Fannon
- NC Rural Water Association
  - Daniel Wilson
- SC Department of Natural Resources
  - Scott Harder

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Stakeholder Advisory Committee
Next Steps

- Complete Scenario Development Survey within two weeks (by May 15)
- Read and sign committee charter
- Join Microsoft Teams – Stakeholder Advisory Group page implementation

- Next meeting: July 15-17
  - Topic: Draft Scenarios

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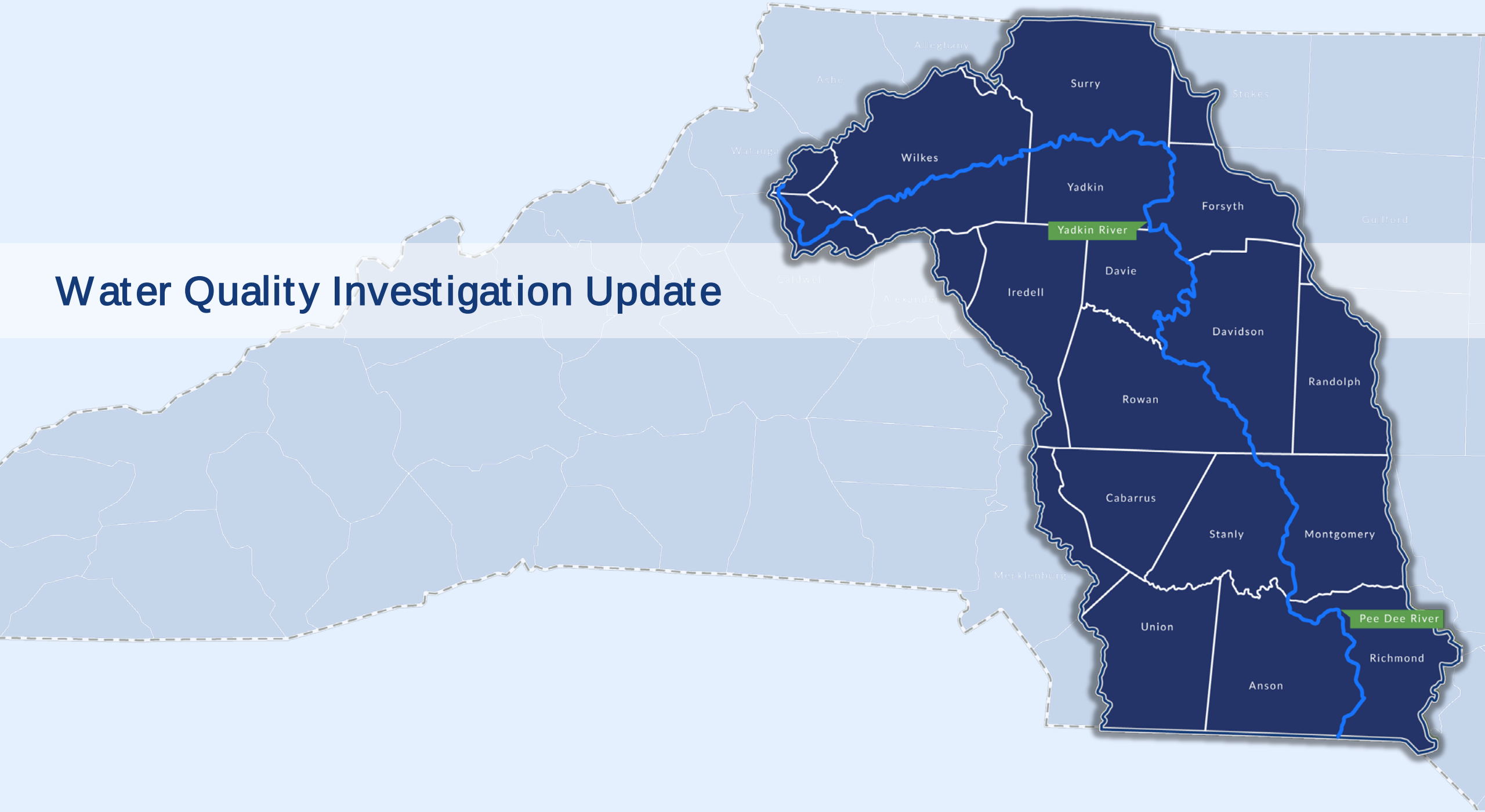
Water Quality Investigation Update



Phase 5b Overview

Identify future water quality issues in the Basin…

- **Task 1:** By evaluating **previous water quality studies and models**.
- **Task 2:** That are subject to current, and possible future, **rules and regulations**.
- **Task 3:** That are addressed by **watershed protection opportunities** and land use requirements in the Basin.
- **Task 4:** And **summarize** within the Basin by compiling the reviewed information on water quality considerations, regulatory requirements, and watershed protection opportunities.

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Task 1: Previous WQ Studies and Models

Current Progress: Reviewing and summarizing previous work

Studies

Yadkin Pee Dee Basinwide Water Quality Plans (1998, 2003, 2008)
- NC DEQ

Pee Dee River Basin Watershed Water Quality Assessment (2007)
- SC DHEC

Water Quality of NC Streams; Yadkin- Pee Dee River System (1983)
- USGS, NC DNR

Federal Water Quality Monitoring – Water Quality Portal Data
- EPA, USGS

Models

Federal
- SPARROW model (USGS), 2014

State
- High Rock Lake Hydrodynamic and Nutrient Response Models (EFDC & WASP), 2012/2016
- High Rock Lake Watershed Model, 2012

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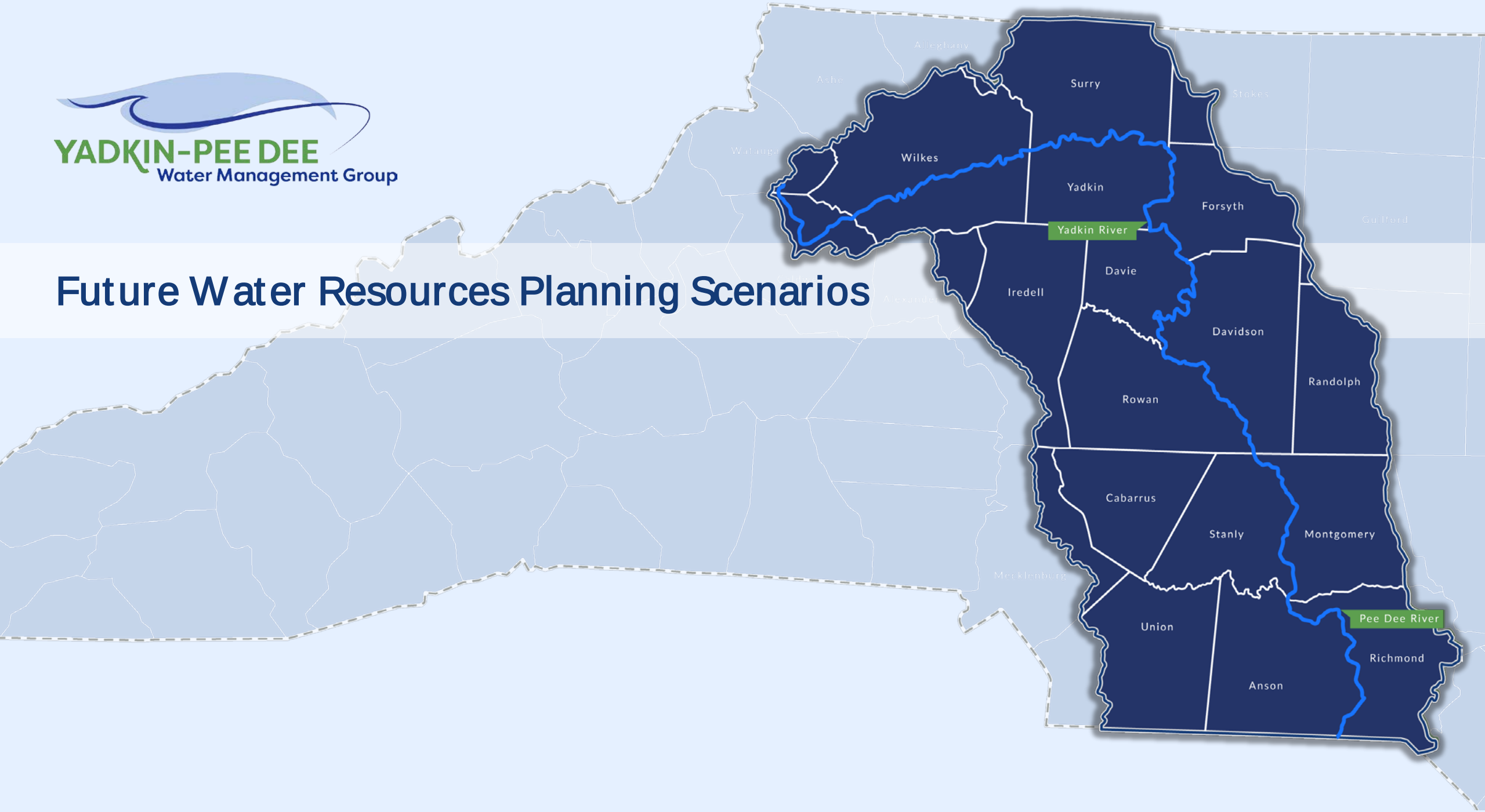
Future Water Resources Planning Scenarios



Water Resources Plan

Purpose

- To ensure a sufficient supply of water in the Yadkin-Pee Dee River Basin long into the future by guiding regional coordination around complex water management issues.

Means

- Identify and fully understand key water supply issues for the Yadkin-Pee Dee River Basin
- Evaluate potential strategies to solve these issues
- Identify and implement practical solutions on a basin-wide level
- Engage stakeholders to ensure the plan reflects the community

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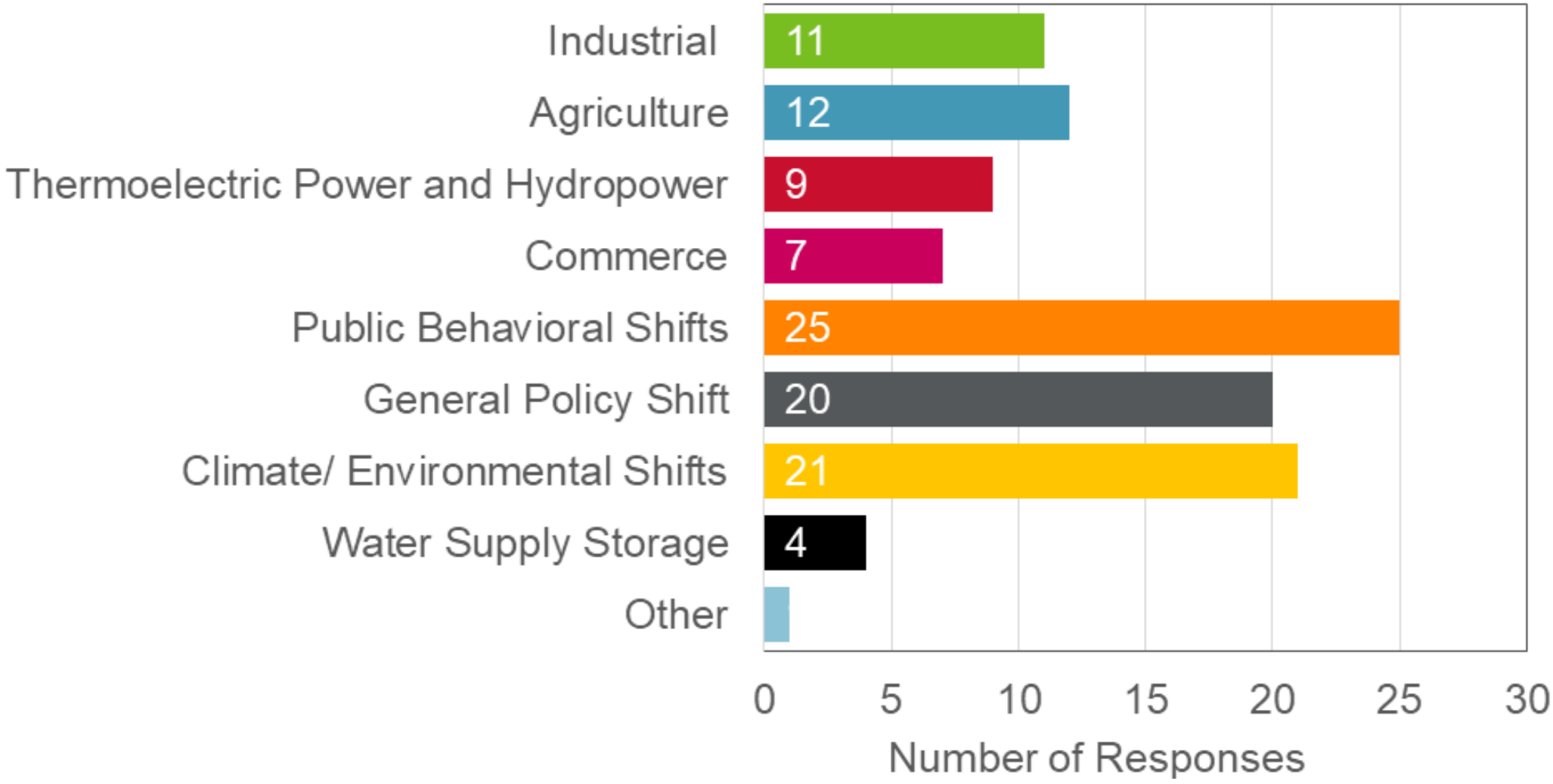
Scenario Development – Responses



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Scenario Development – Top 10 Scenarios

Scenario Category	Scenario
Climate/ Environmental Shifts	Drought reduces supply
	Storms become more infrequent and intense
	Increase in sedimentation decreases reservoir storage and/or restricts intakes
General Policy Shift	New policy or regulation requires an increased quality of wastewater discharge (e.g. High Rock Lake Nutrient Management)
	W. Kerr Scott Reservoir revises flow release protocol
	New regulation/ policy requires an increase in the price of water, which decreases demand
Industrial	Increase in industry wastewater production (e.g. poultry processing), resulting in degraded water quality
Public Behavioral Shifts	Increased population growth within the region, which increases demand
	Increased regionalization as people move to urban centers and become less reliant on well water, which increases demand
	Changes to IBT, which allows more water to leave the Basin

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Selected Scenarios

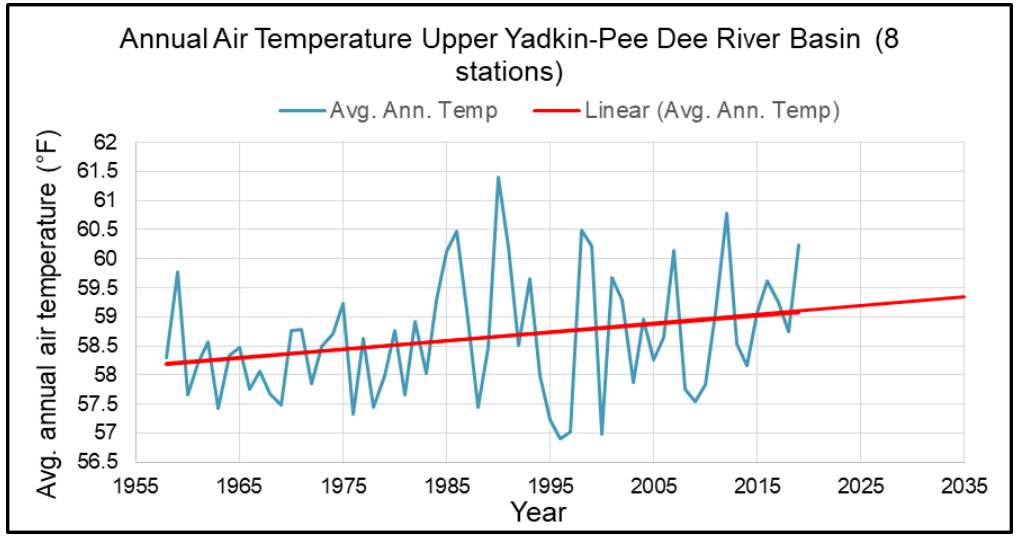
Baseline Impacts of Climate Change

This scenario will analyze the projected impacts of climate change on water resources in the basin and incorporate them into the baseline models.

- Climate change presents several variables for consideration including:
  - Higher temperatures
  - Greater evapotranspiration
  - Greater reservoir surface evaporation

Scenario

- Include climate change in baseline evaporation and streamflow rates in OASIS hydrologic model
- Utilize more conservative climate change scenario for projections
  - RCP 4.5 : Emissions continue at current rate through 2050, then decrease



Current temperature trend in YPD

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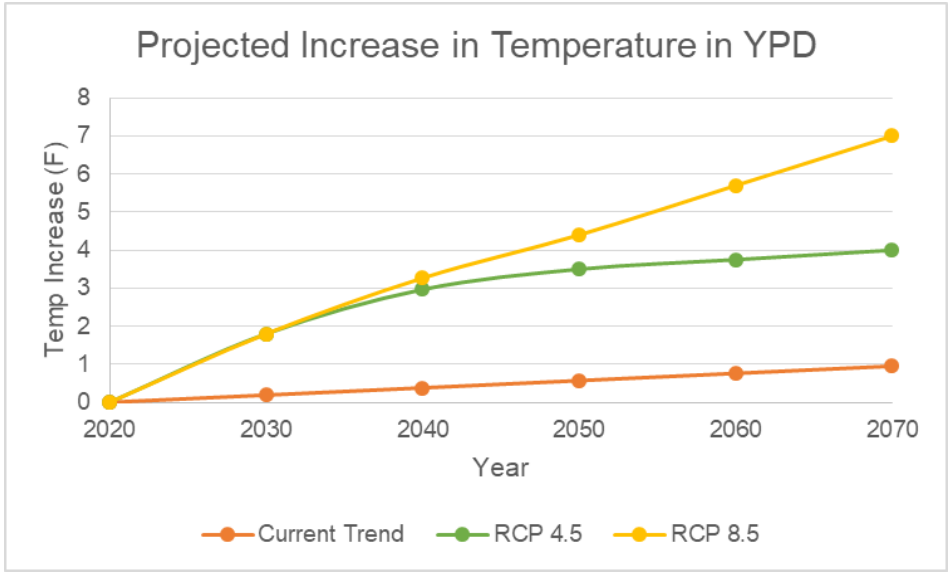
Extreme Drought

This scenario will produce and analyze worst-case drought data by including more extreme climate change effects for prolonging and intensifying droughts in the basin.

- Droughts are reoccurring and often impact available water supply and quality
- Future droughts likely intensify with increased temperatures

Scenario

- Include climate change in evaporation and streamflow rates in OASIS hydrologic model
- Evaluate future water supply using OASIS hydrologic model with less conservative climate projections
  - RCP 8.5 : Emissions continue at current rate through 2100



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Less Frequent, More Intense Storms

This scenario will model predicted future increases in precipitation and their effect on intensifying the severest storms on record in the basin.

- Global shift in storm patterns is emerging:
  - Less frequency, greater variability
  - More intense, higher amounts precipitation
- Highest precipitation event in the Basin since 1958 was Hurricane Florence

Scenario

- Utilize OASIS Model to simulate using data from Hurricane Florence
- Increase precipitation and therefore streamflow as projected by RCP 4.5 & 8.5 climate change scenarios
- May adjust storm event for conditions projected for 2030-2070

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Increase in Sedimentation

This scenario will model predicted future increases in sediment erosion and accumulation in the Basin and its effect on long-term reservoir storage and operations.

- Sedimentation rates decreased 1950-1990 due to reduction in agricultural land and increased soil management in YPD
- Future trends in sedimentation rates impacted by increased urbanization and watershed protection opportunities/activities
- Baseline sedimentation rates are being developed for each reservoir

Scenario

- Utilize OASIS Model to simulate hydrologic flows over time using baseline sedimentation rates
- As a sensitivity analysis, adjust sedimentation rates +/- 5% and +/- 10%
- Increased sediment in reservoirs will be distributed to impact capacity in usable and unusable storage.

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Increased Wastewater Quality

This scenario will leverage the documented work to model the impact of stricter WW quality regulations the basin's water resources.

- Potential for future regulations/policies to enforce stricter wastewater quality standards
  - Directly impacts WWT facilities and water bodies used as discharge sites
  - Indirectly impacts downstream water treatment facilities, aquatic life, and users of affected water bodies

Scenario

- Leverage work on High Rock Lake and evaluate a Basin-wide limit on P & N
- Excel-based desktop analysis to evaluate overall impact of chlorophyll-a levels

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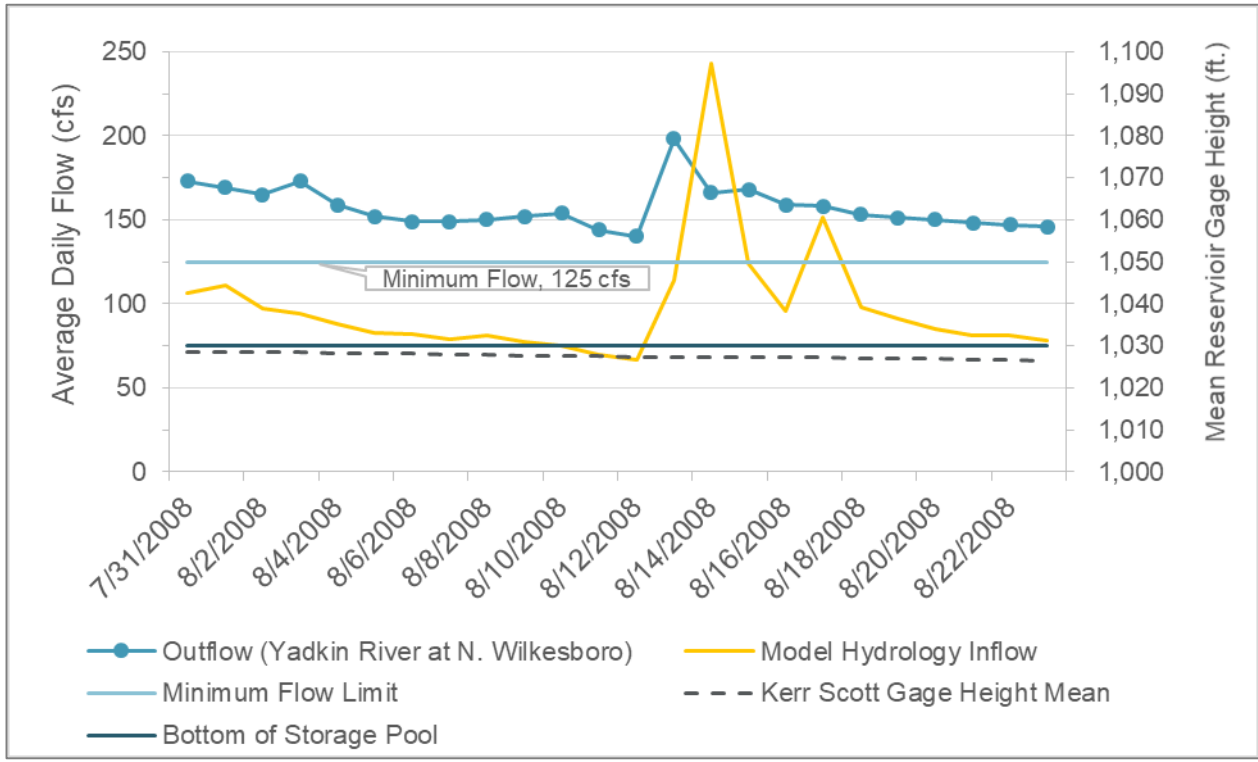
Revised Flow Release Protocol at W. Kerr Scott Reservoir

The scenario will provide a two-part analysis to simulate the impacts of a varied management approach on the Basin's resources

- **Scenario(s)**
  - Utilize OASIS Model to simulate using data from the 2008 drought
    1. Adjusting stream flows where inflows match outflows until outflow is 125cfs
    2. Increase storage capacity by 5ft (1,030 to 1,035 ft. above mean sea level) at W. Kerr Scott Reservoir



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Reduced Water Consumption Due to Price Increase

This scenario will evaluate the potential impact increased funding will have on water consumption.

- Utilities will require additional funding to ensure sufficient supply, quality, and safety
- Cost will be passed on the customers

- **Scenario:**
  - Data- Local Water Supply Plans
  - Excel projection database has functionality for the user to adjust the annual increase in water bill by 2.5%, 5%, and 10%
  - 10% increase in a water bill → the demand will decrease from 3% to 8%
- Projected water demand to 2070

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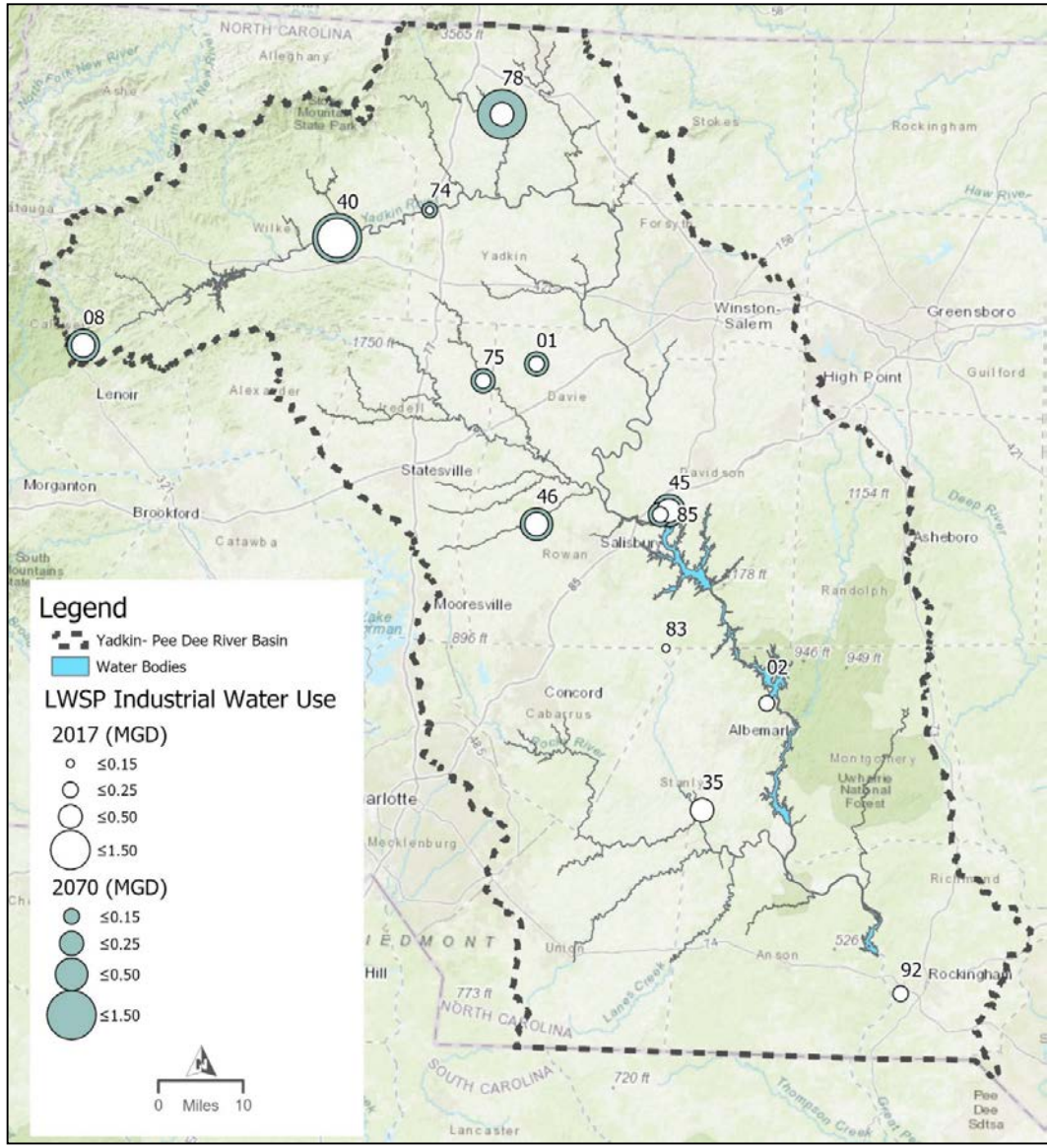
Increase in industry wastewater production

This scenario will evaluate the potential impact increased in wastewater production on basin water quality.

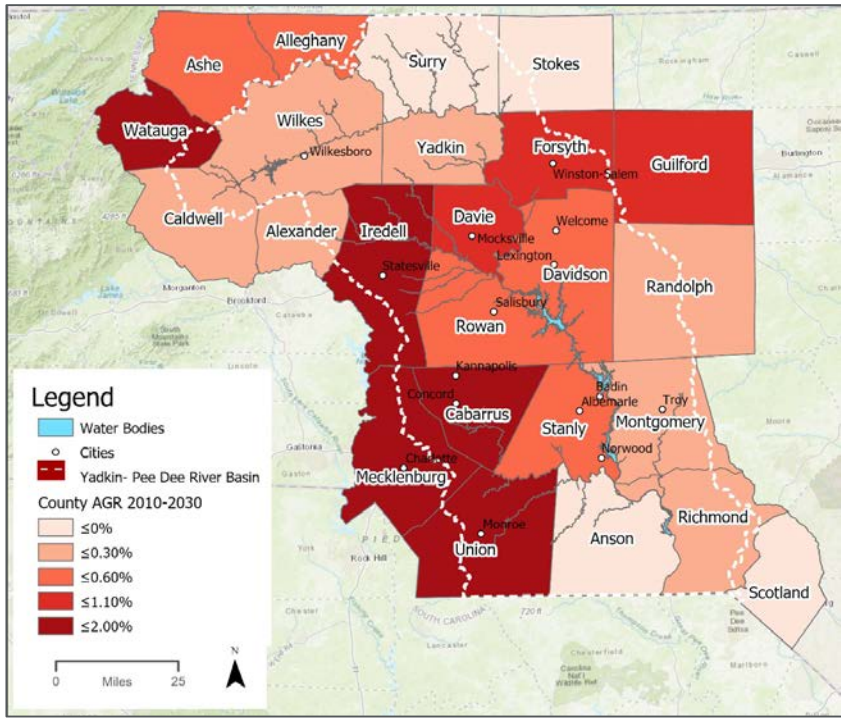
- Utilities will require additional funding to ensure sufficient supply, quality, and safety
- Cost will be passed on the customers

- **Scenario:**
  - Data- Local Water Supply Plans and permit information
  - Excel projection database has functionality for the user to adjust the annual increase decadal water returns by 50%, 100%, 150%, or 200%
  - Key water quality parameters :
    - dissolved oxygen, nitrogen, phosphorus, ammonia, and total dissolved solids.



Increased Water Demand from Population Growth

- Expected annual growth rate of counties in the Basin:
  - 1.3% or 450,000 additional people by 2038
- **Scenario(s)**
  - Develop tool in the Excel projection database to simulate the future water demand based AGR projections from percentile updates
    - User selects the 10th, 25th, 50th, 75th, and 90th percentiles of projection
    - Water demand will be shifted by 5, 10, or 15 years earlier



This scenario will evaluate future water demand by amplifying the population growth projections

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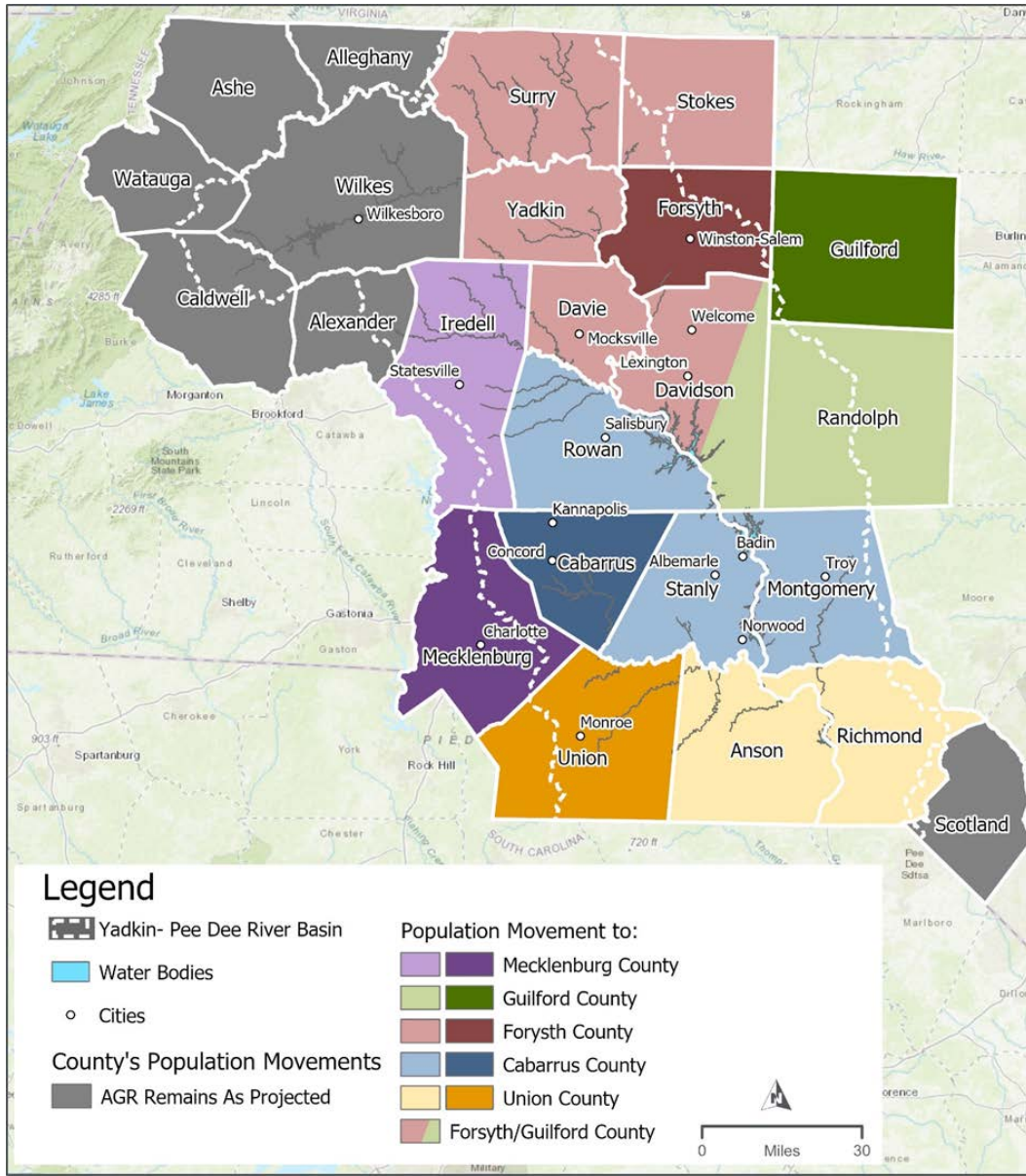
Regionalized Demand Increase

- Greater rate of population growth in metropolitan areas and surrounding regions and I-85 corridor.

- **Scenario**
  - Excel projection database will re-calculate water demand impact after adjusting future county AGR
    - Grey counties: AGR remains the same
    - Light colored counties: Half of county's future AGR shifts to nearby utilities in high-growth areas.
    - Dark colored counties: AGR as projected **plus** portion of AGR of nearby counties.

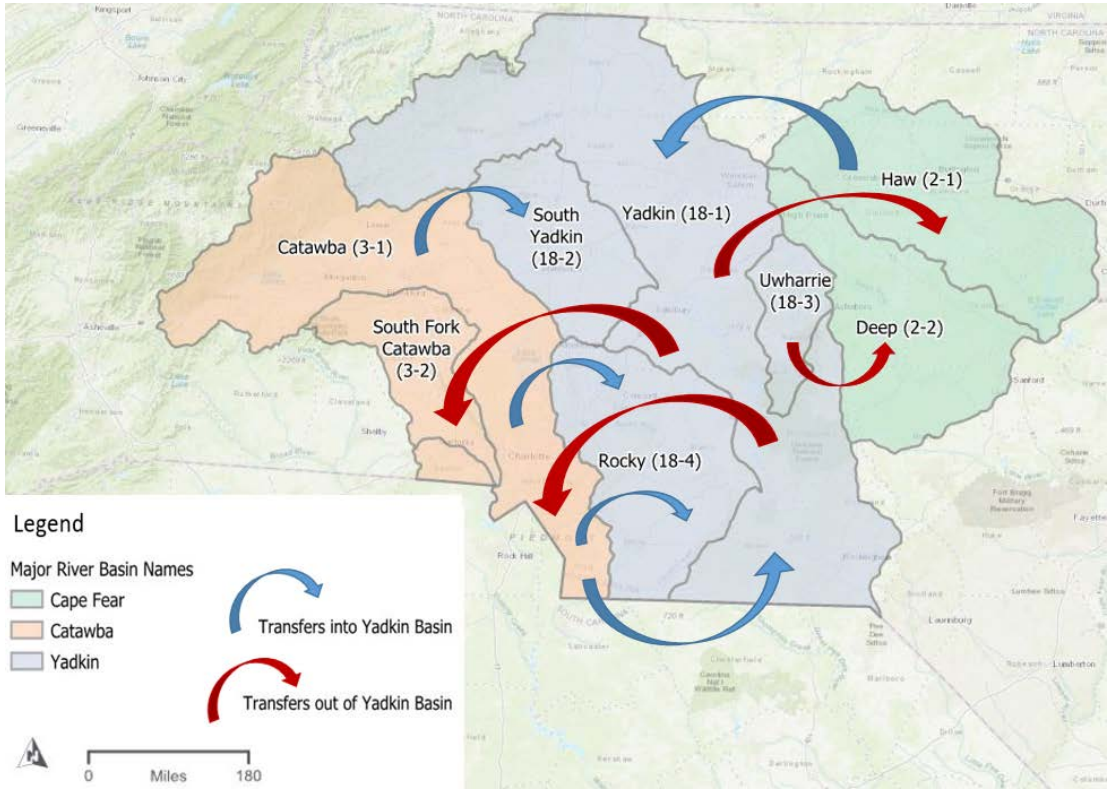
This scenario will evaluate future water demand by amplifying transition of the population toward surface water uses in urban areas.



Interbasin Transfers (IBTs)

This scenario will evaluate potential impacts due to reduced water supply in the YPD because of changes in IBTs.

- IBTs transfer surface water from one basin to another.
- Currently 8 major IBTs in YPD basin:
  - 5 bring external water into YPD basin
  - 3 transfer YPD water to another basin
  - Additional 3 IBTs support sub-basin transfers within YPD basin, with 1 more planned
- **Scenario(s)**
  - Utilize OASIS model to simulate additional 10 MGD and 20 MGD IBT withdrawals from each YPD reservoir (except Falls)
  - Simulate ending all transfers into the YPD



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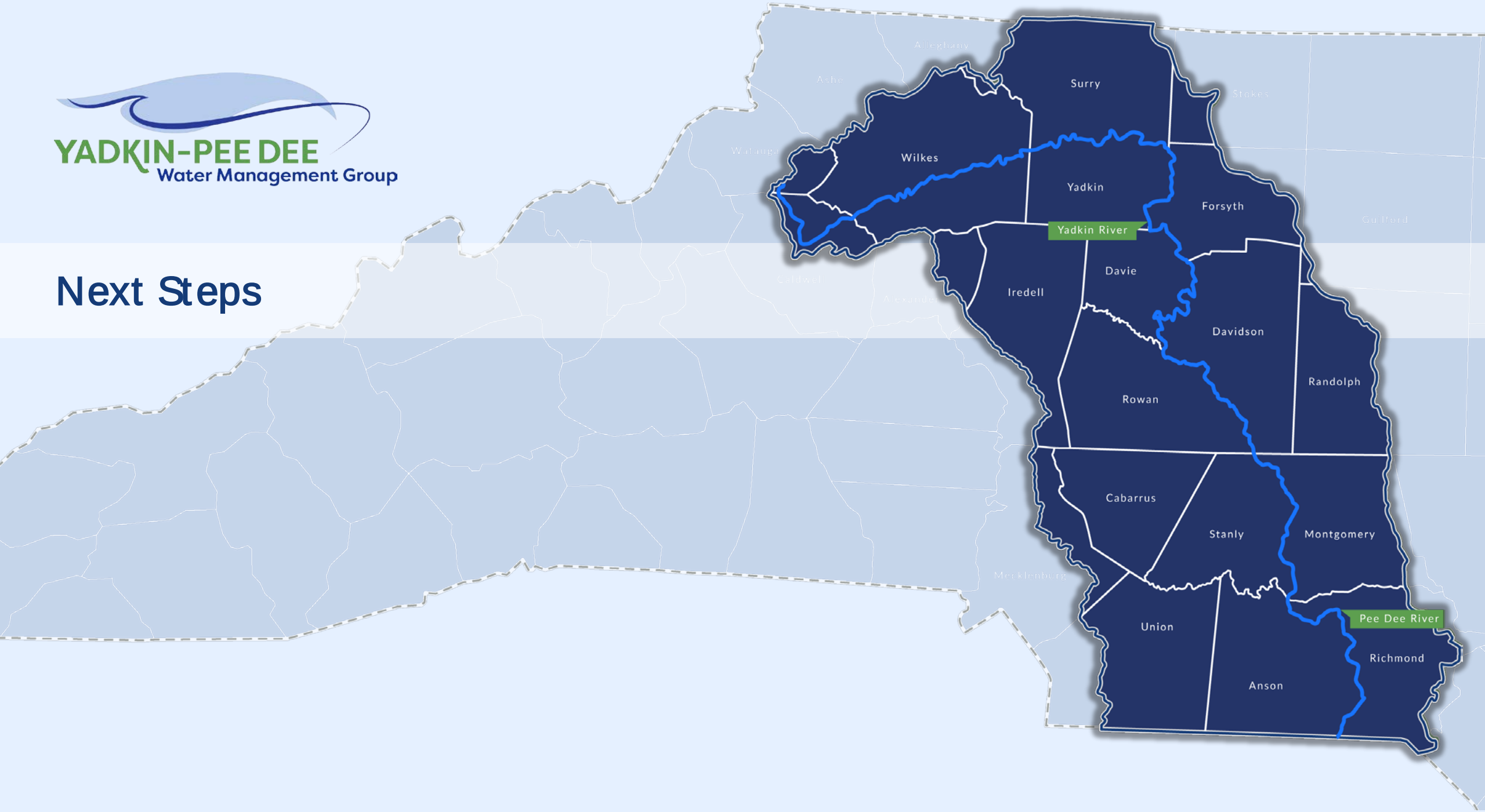
Next Steps



Thank you!

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