TMDLs in EPA Region IV: Alternatives to Traditional TMDLs

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Water Body Impairment, Degraded Stream List, Section 303(d)--CWA

- Stream Segments—Specific Pollution Source(s)
- Lake/Reservoir or Estuary Waterbody Impairment
- Impaired Waters with Multiple Pollution Sources
- Cumulative Loading Crossing Political Jurisdictional Lines
- Complex Ecological Interactions/Processes

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Addressing Impairment Using Water Quality Management Strategies (Plans)

- Requires Comprehensive, Basinwide Source Control
- Often Requires a Framework of Regulations
- Must Take into Consideration Equitable Assignment of Responsibility
- Employs Stakeholder Processes for Implementation

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Application to Eutrophication Issues in Lakes, Reservoirs and Estuaries

- Biological Integrity
  - Algae Levels
  - Species Considerations
  - Use Impairment
- Key Water Quality Standards
  - Chlorophyll *a*
  - pH
  - Dissolved gases

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NC's Chlorophyll *a* Standards

Freshwater (15A NCAC 2B .0211)

- Not greater than 40 ug/L
- Not greater than 15 ug/L for EMC classified trout waters

Saltwater (15A NCAC 2B .0220)

- Not greater than 40 ug/L

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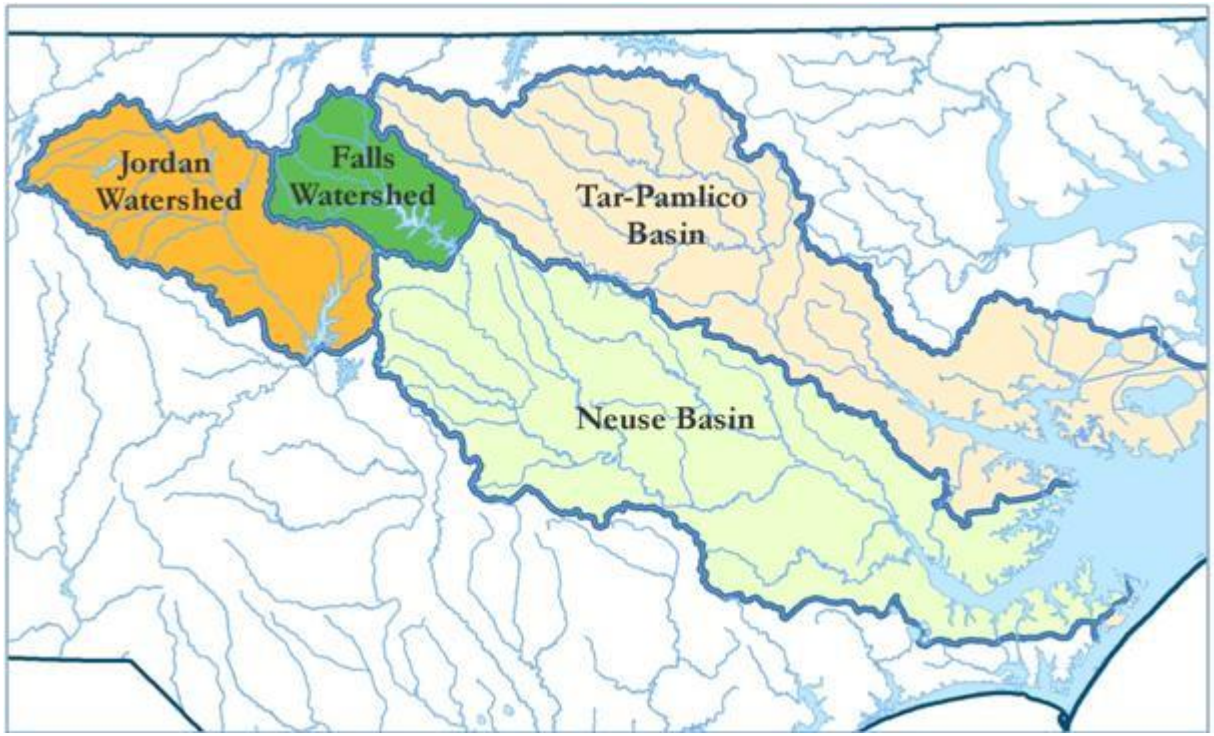
North Carolina Nutrient Management Strategies



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Case Study: The Falls Lake Nutrient Management Strategy

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The Challenges of Falls Lake In a Nutshell

- Controversial Corps of Engineers reservoir
- Primary source for public water for one jurisdiction
- Concerns about water quality
- *Chlorophyll-a* water quality impairment
- Legislative action to require nutrient management
- Very restrictive nutrient reduction requirements
- Reductions required for existing development
- Expensive Stage I requirements
- Costly Stage II requirements

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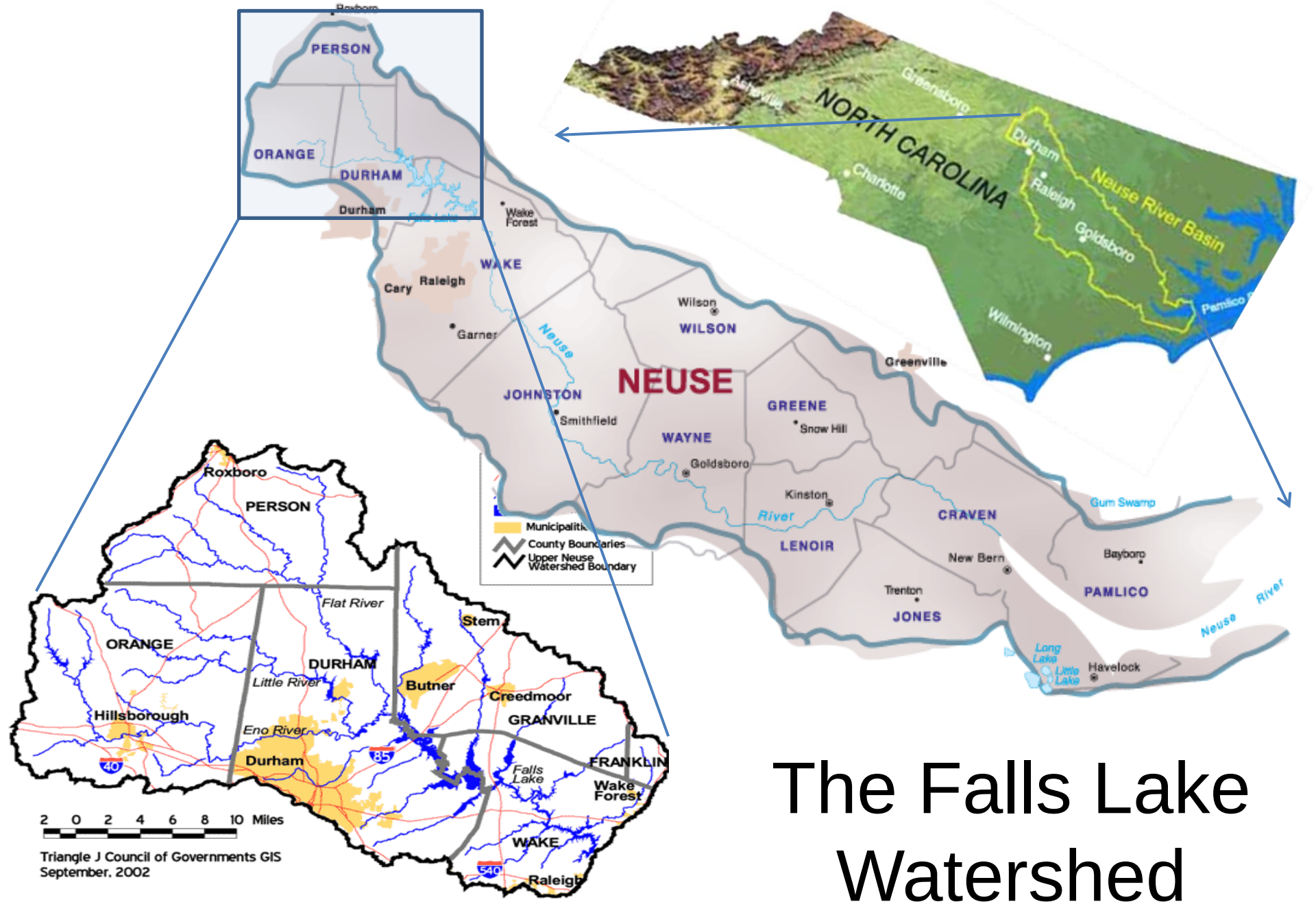

The Falls Lake Watershed

History of the Issues: Development of the Consensus Principals

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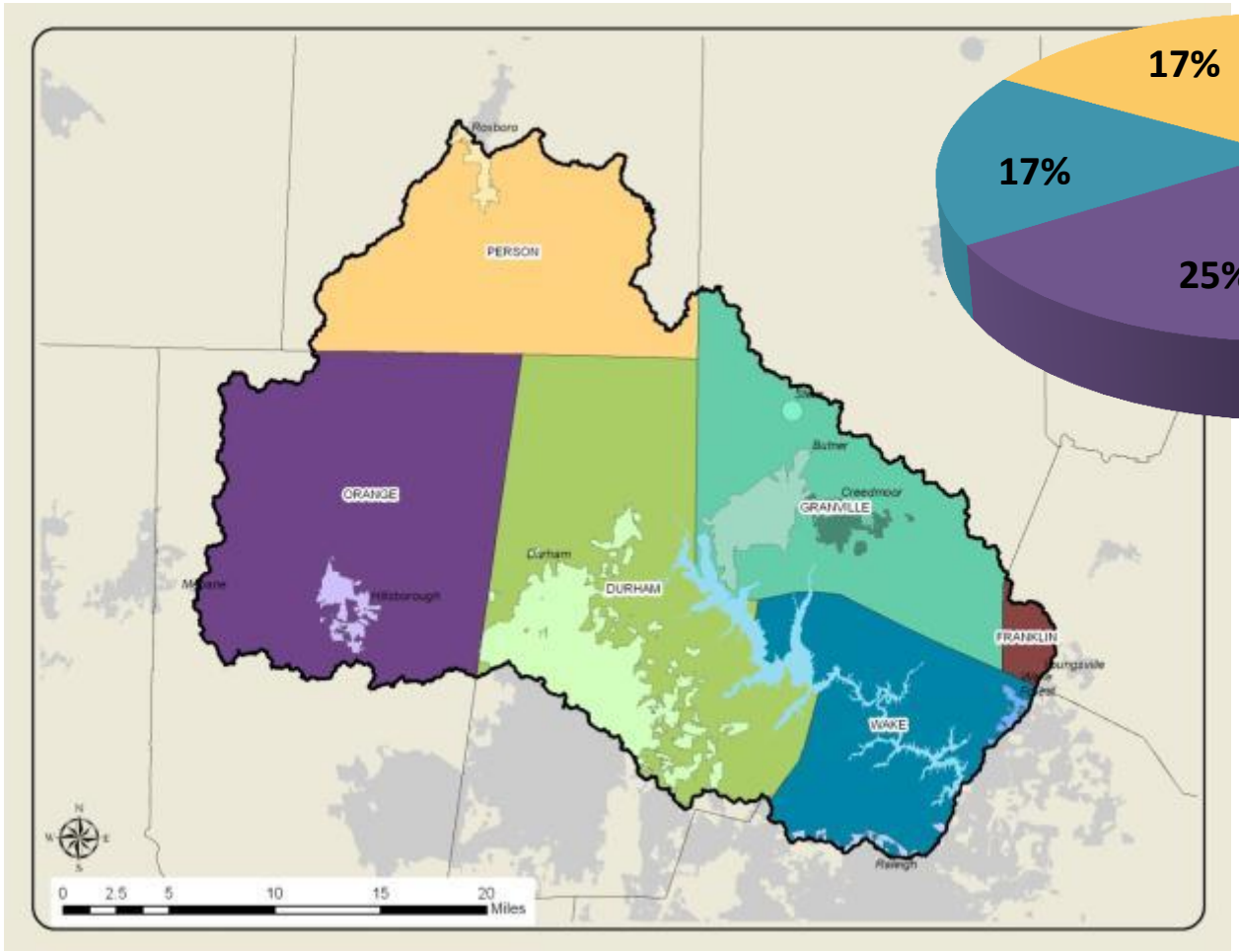
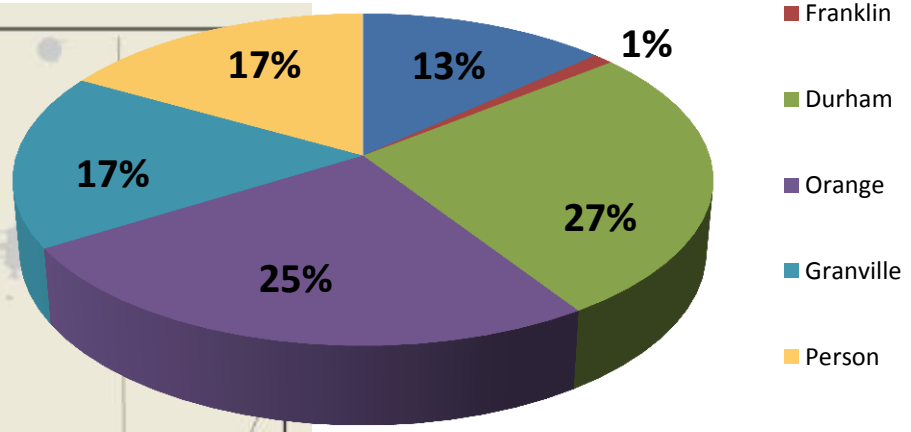
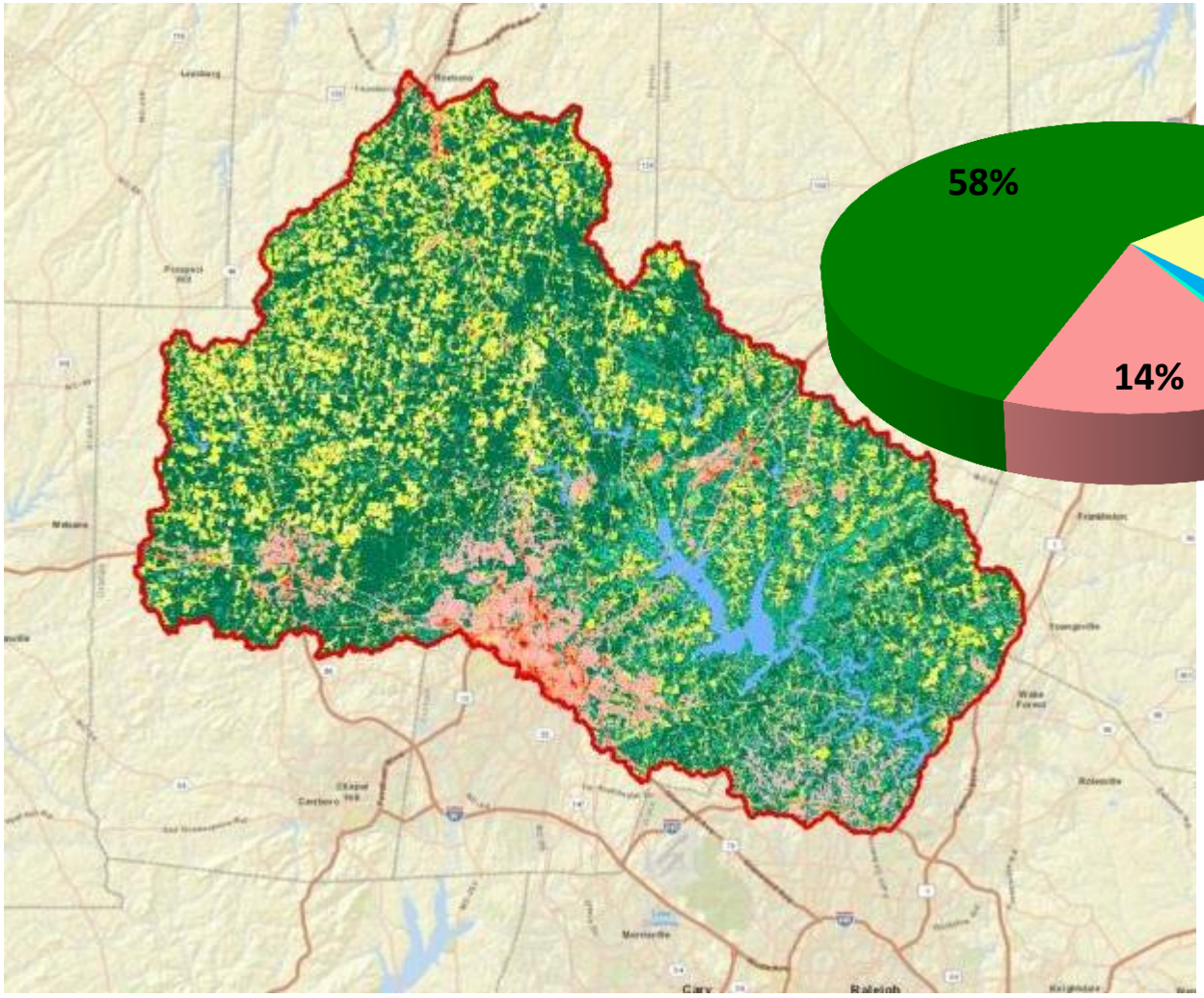
The Upper Neuse Facts

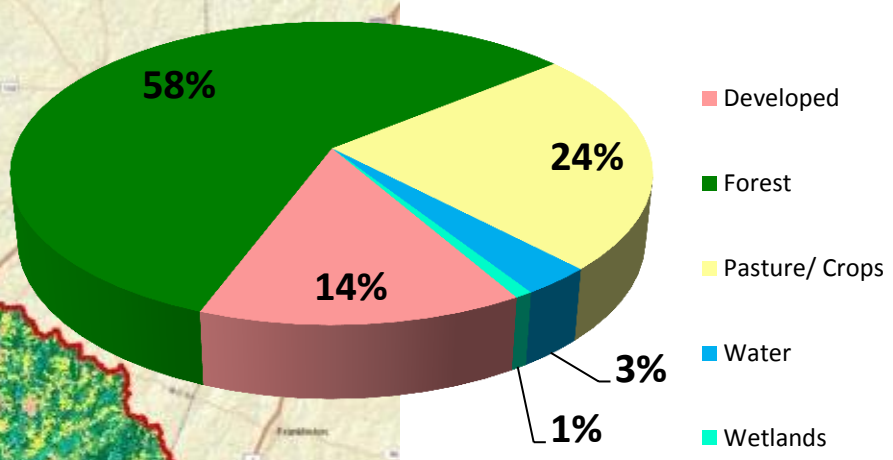




- 770 square miles
- 6 counties
- 8 municipalities
- 6 public drinking water systems
- 9 water supply reservoirs



Land Cover



Cities squabble as lake festers

Proliferating algae form light-green patches on Falls Lake, the drinking water supply for 435,000 Wake County residents.

PHOTO COURTESY OF TRAVIS MOTLEY-PEARSON

Raleigh wants Falls Lake cleanup now. Durham wants more time.

By Jim Wise
STAFF WRITER

FALLS LAKE POLLUTION LEVELS VARY

The upper reaches of Falls Lake have the highest levels of nitrogen and phosphorus pollution, as indicated by the presence of chlorophyll-a, a commonly used indicator. Excess nutrients such as nitrogen and phosphorus can lead to harmful algae growth that makes water difficult and expensive to treat for human use.

The Memorandum of Agreement Between Stakeholders, known as the “Consensus Principles”

2010, NC Adopts the Falls Lake Nutrient Management Strategy as a Comprehensive Set of Rules

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Falls Lake Rules

(15A NCAC 2b)

.0275 Purpose and Scope (Goals)

.0276 Definitions

.0277 Stormwater – New Development

.0278 Stormwater – Existing Development

.0279 Wastewater Discharges

.0280 Agriculture

.0281 Stormwater State & Federal Entities

.0282 Trading

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Framework for Rules (As Guided by Consensus)

- > Adaptive Management & Staged Implementation

Stage I *(2011- 2021)*

- > Initial reductions watershed wide
- > Achieve standards in lower lake

Stage II *(2021 – 2036)*

- > Additional reduction in upper watershed
- > Reduction objectives: 40% TN 77% TP
- > Achieve standards throughout lake by 2041

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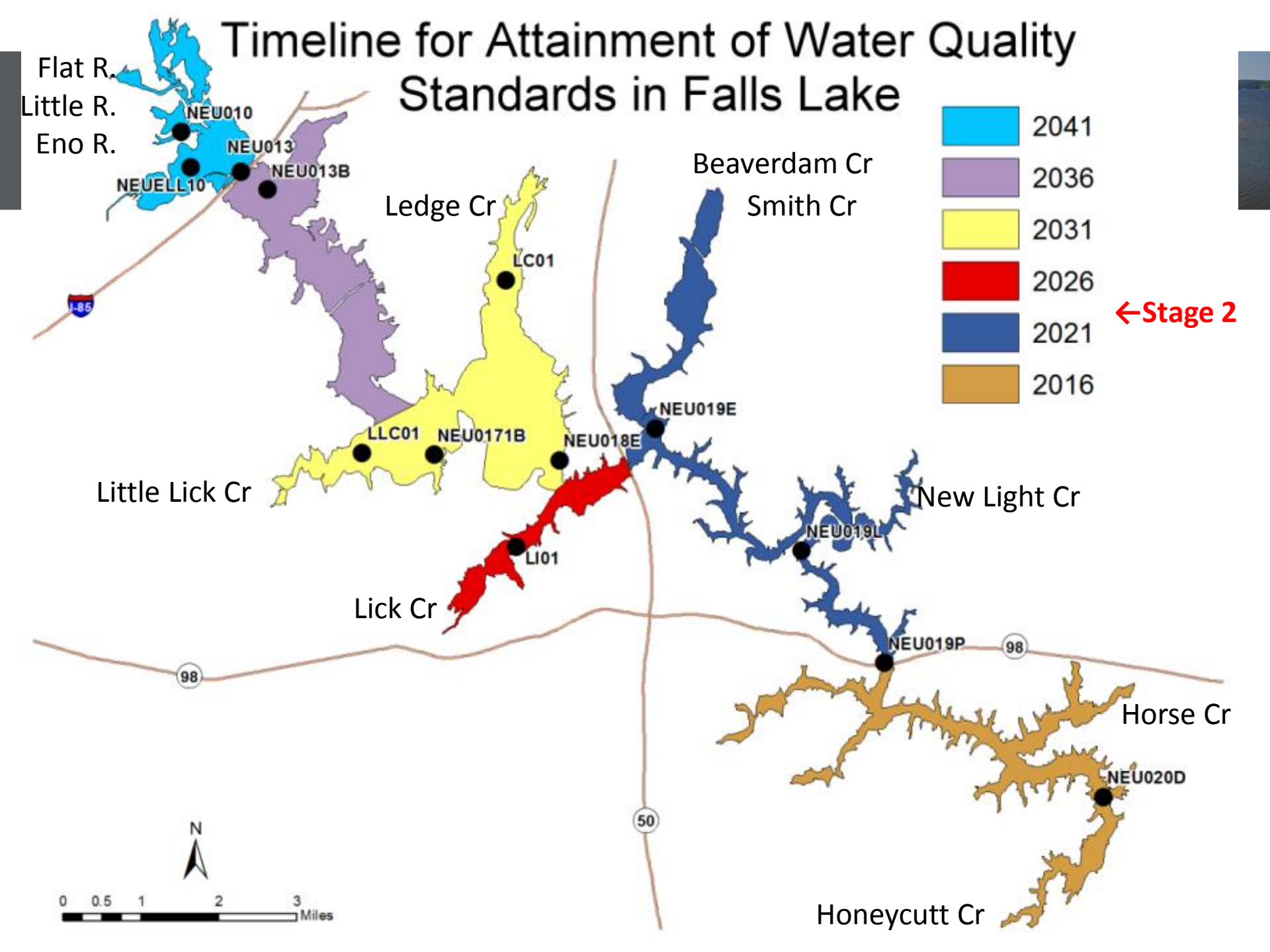
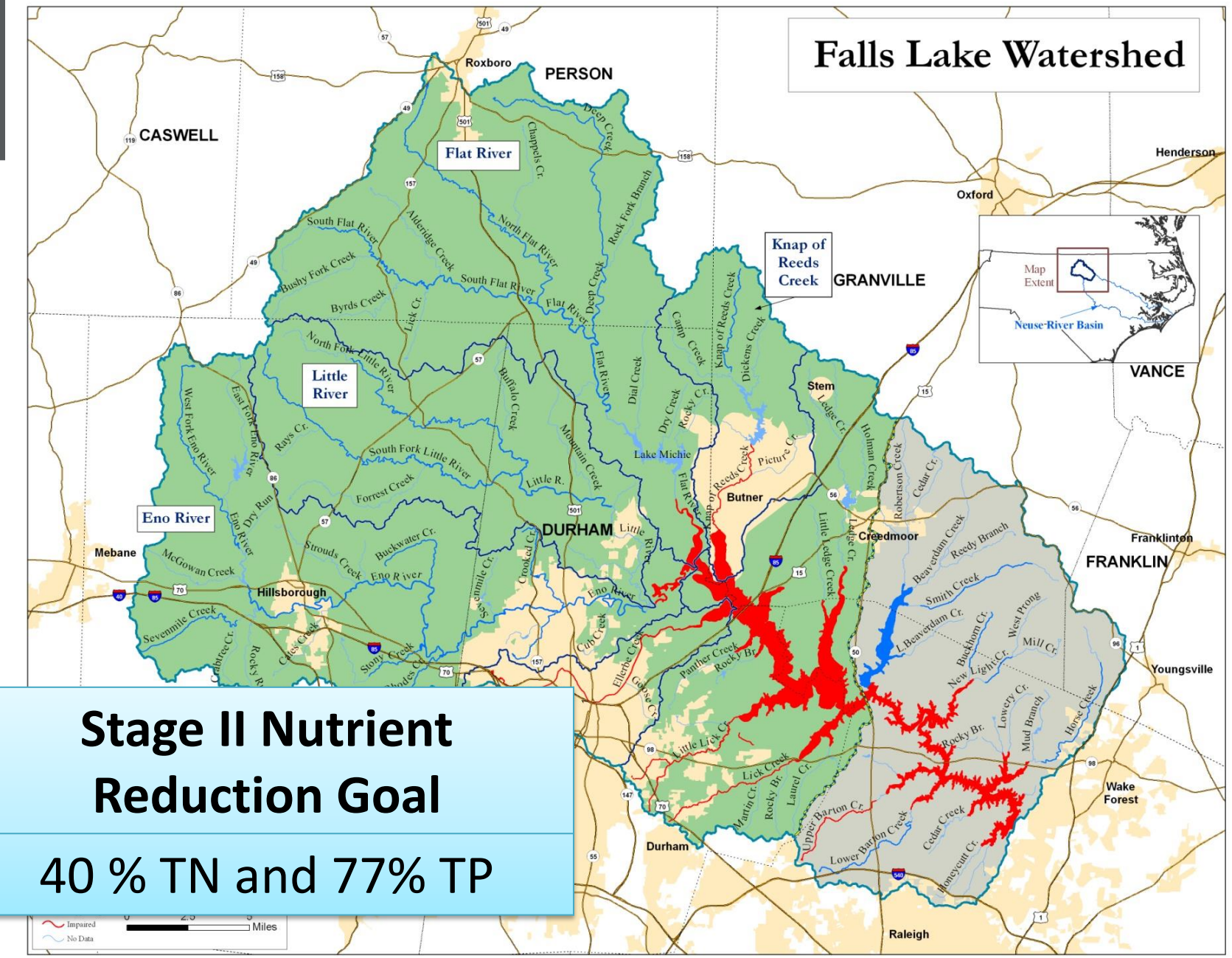

Timeline for Attainment of Water Quality Standards in Falls Lake
Flat R.
Little R.
Eno R.
NEU010
NEU013
NEU013B
NEUELL10
I-85
Ledge Cr
LC01
Beaverdam Cr
Smith Cr
2041
2036
2031
2026
2021
2016
←Stage 2
NEU019E
LLC01
NEU0171B
NEU018E
Little Lick Cr
New Light Cr
NEU019L
LI01
Lick Cr
NEU019P
98
98
Horse Cr
NEU020D
50
N
0 0.5 1 2 3 Miles
Honeycutt Cr



Stage II Nutrient Reduction Goal

40 % TN and 77% TP

Falls Lake Existing Development Rule Requirements

- All Local Governments in Watershed
  - Implement measures - reductions from existing developed land
  - Two Stages of Implementation
- Stage I : Back to 2006 baseline by 2020
- Stage II: 40% TN & 77%TP reduction goals by 2036
- Annual Reporting
- Implementation / Model Program Approval by EMC

NC's Technical Basis for the Rules

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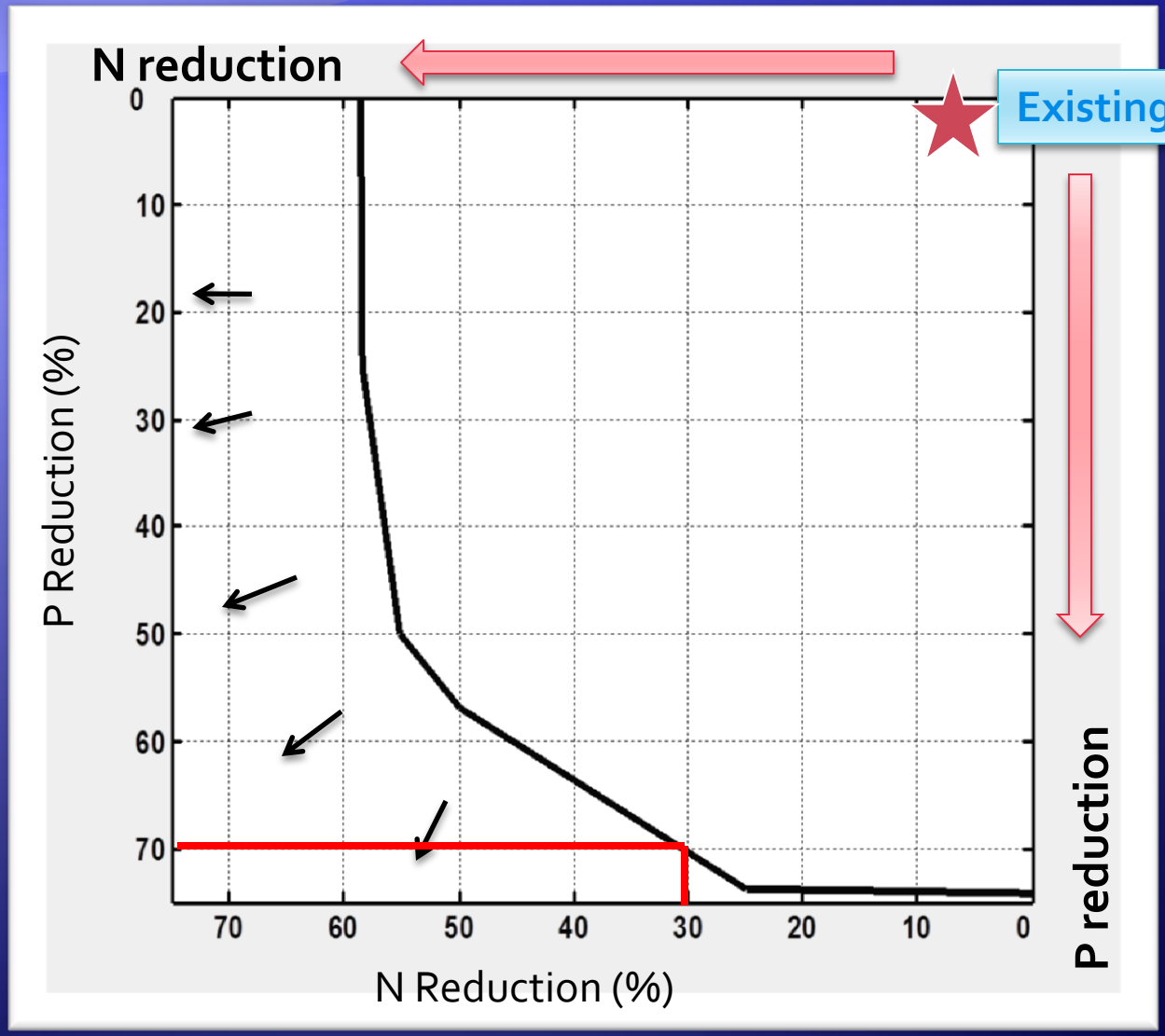
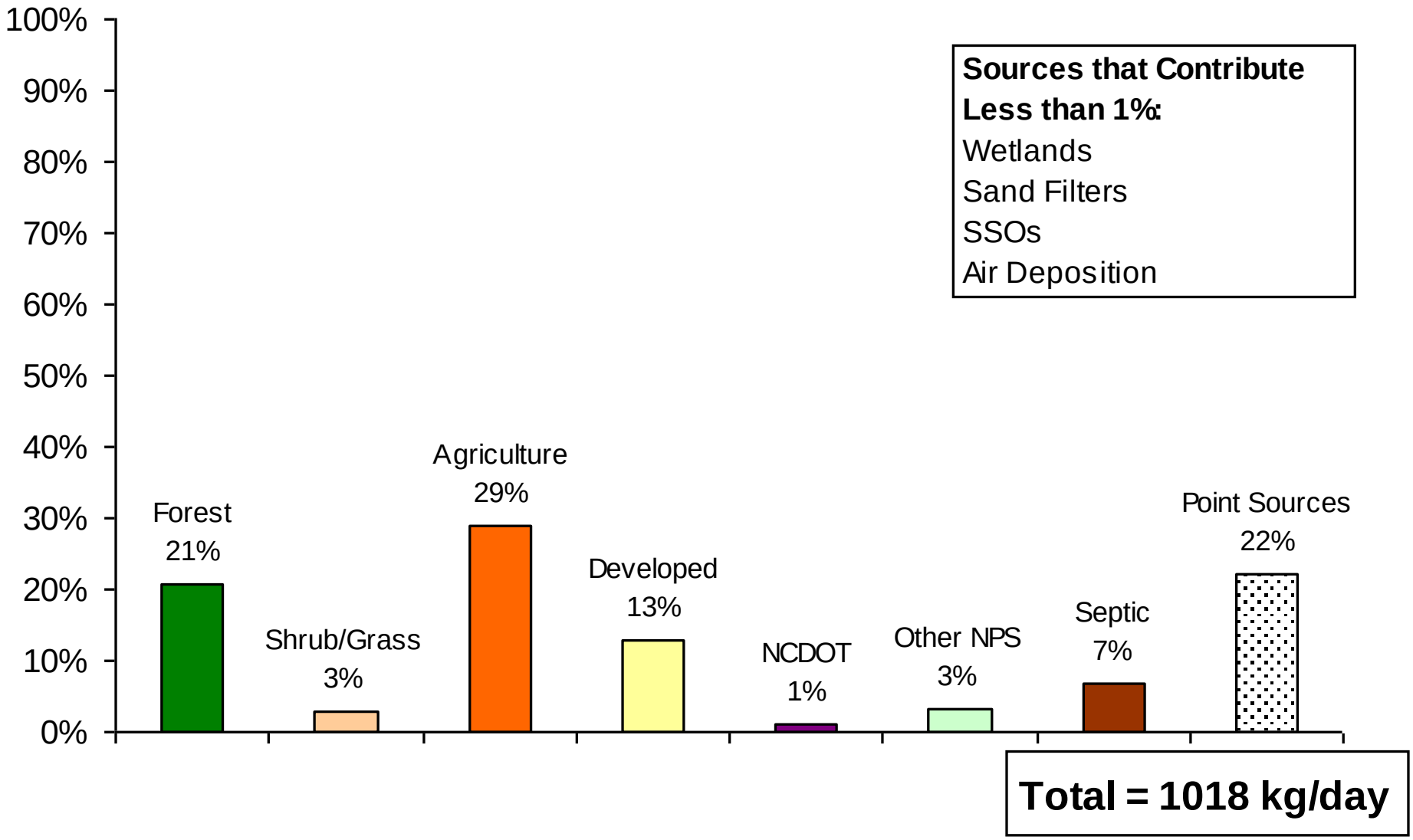
Falls Lake EFDC* Model Results
Nitrogen and Phosphorus Reduction Curve

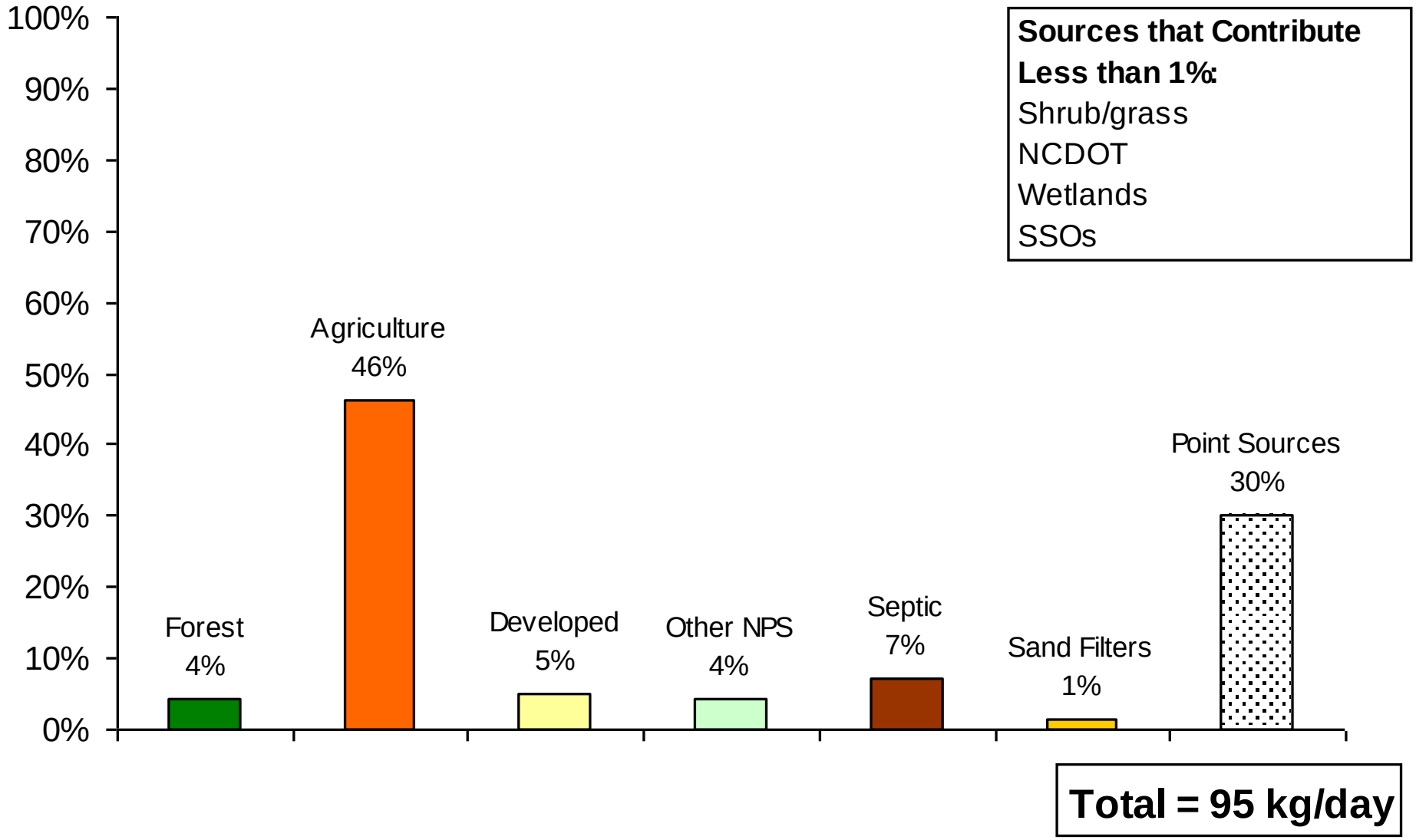
* Environmental Fluid Dynamics Code



2006 Estimated Total Nitrogen Delivered Load (kg/d) From The Five Upper Watersheds



2006 Estimated Total Phosphorus Delivered Load (kg/d) From The Five Upper Watersheds



The Role of the Upper Neuse River Basin Association (UNRBA)

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A Brief History of the UNRBA

- Formed in 1996 due to continued concerns about the future water quality of Falls Lake
- Initial focus was information development and general study of the Lake and its watershed
- The organization shifted goals and objectives following the adoption of the Falls Lake Nutrient Management Strategy and the passage of the Falls Lake Rules in 2010
- Ongoing focus to assist member jurisdictions with Strategy implementation and reexamine the Stage II Rules

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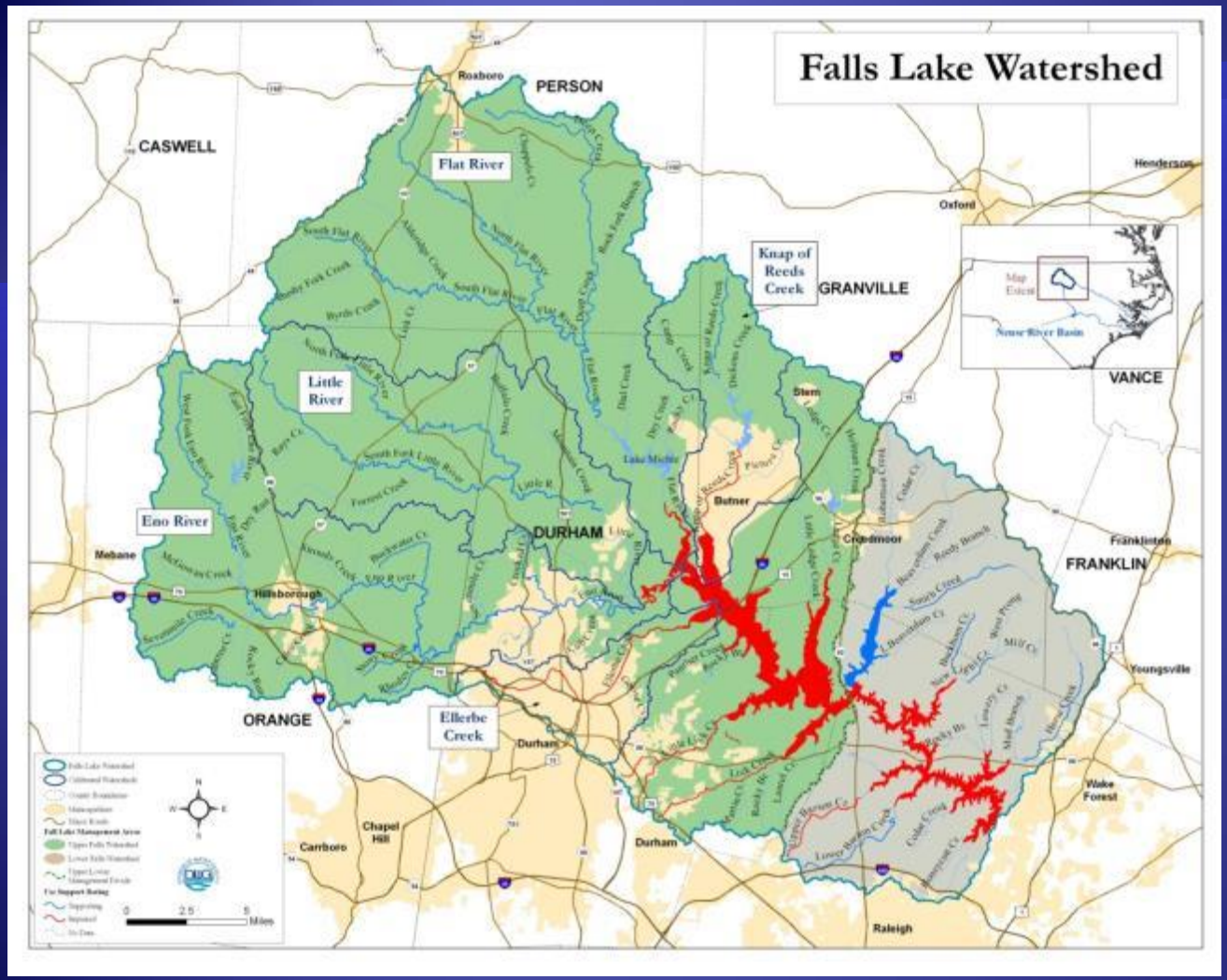


- Includes 14 Jurisdictions

UNRBA Members

Municipalities

Butner
Creedmoor
Durham
Hillsborough
Raleigh
Stem
Wake Forest

Counties

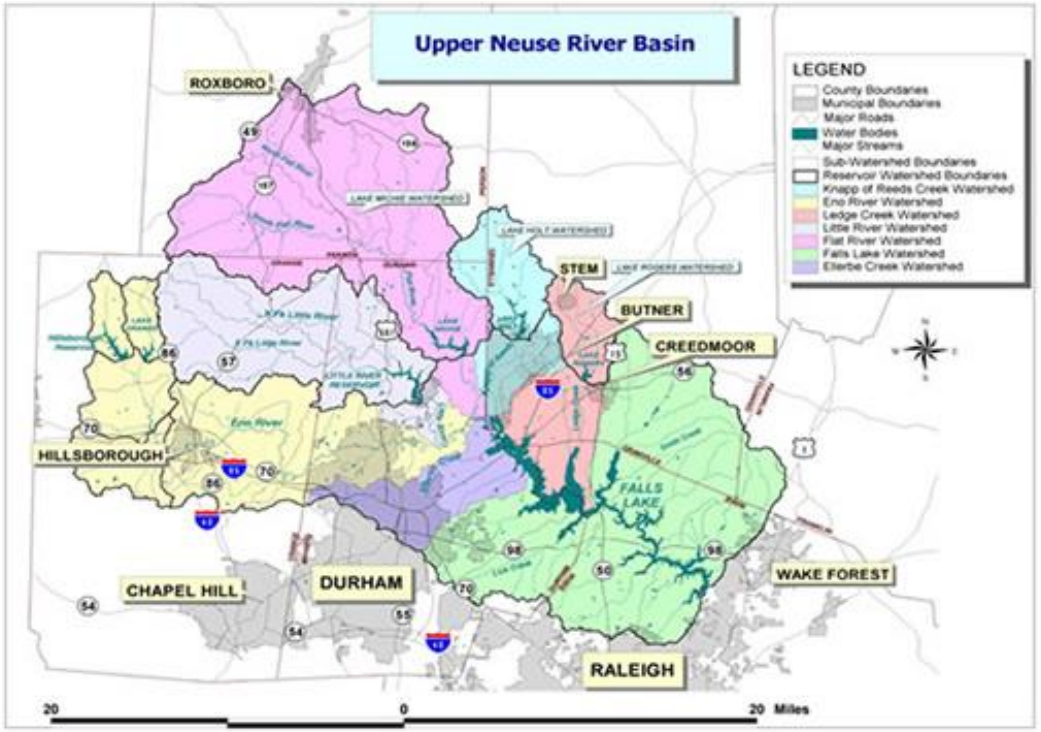
Durham
Franklin
Granville
Orange
Person
Wake

South Granville Water and Sewer Authority (SGWASA)

Soil and Water (Ex Officio)

Key Issues Facing UNRBA Members

- Subject to Falls Lake Nutrient Management Strategy Rules
- Application of Consensus Principles
- Assisting with Stage I Existing Development
- Re-Examination of Stage II
- Competing Objectives



UNRBA is Moving Forward

- Committed to achieving Stage I
- Dues from $ 120,000 in 2011 to over $ 800,000 in FY 2015
- Credit development project $ 300,000
- Monitoring program $ 800,000 / yr for 4 to 5 years
- New Development in place 2012
- WWTP upgrades for Stage I are near completion
- Falls Lake Watershed versus Jordan Lake Watershed

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Driving Force for the UNRBA: Stage II Regulatory Framework, Cost Factor: More than $ 1B

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UNRBA Re-examination Strategy for Stage II

Assessed existing information

Linked water quality to designated uses

Assessed feasibility of Stage II

- Explored regulatory options
- Developed monitoring program
- Expand the toolbox

Adaptive Monitoring Program (~$800,000 per year)

Analyses

- Identify data gaps
- Statistical models

Optimization

- Parameters
- Frequencies
- Locations

Adaptations

- Test models
- Revise program

Re-examination

- Update lake model
- Recalculate loading targets
- Support regulatory options

Nutrient Credit Project

- Contributors/Partners
  - $300,000 contributed by the UNRBA
  - $50,000 grant from the State
- Develop nutrient credits for measures that currently do not have State approved credits
- Develop a tool that local governments can use to calculate credits

Balancing Ecological Science and Effective Public Policy

- Southern Piedmont man-made reservoir
- Strategy is aimed at meeting *Chlorophyll-a* standards
- Other water quality concerns (TOC and water treatment)
- Costs of strategy versus water quality benefits
- Regulatory and legal options
- Reluctant regulatory agencies
- Member interests may diverge in the future

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These End Points Cannot be Achieved Unless the UNRBA can:

- Maintain cooperative relationships
- Keep the members at the table
- Provide compelling information to support the decisions of the organization
- Deal effectively with changing political climate
- Meet the needs of a diverse membership
- Promote a cooperative and flexible State and Federal response to the science that the UNRBA is developing

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